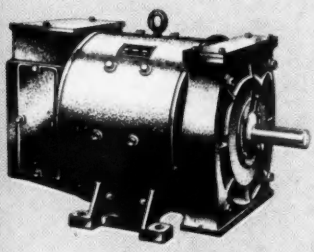
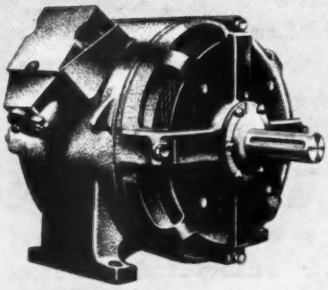
ELECTRICAL TIMES

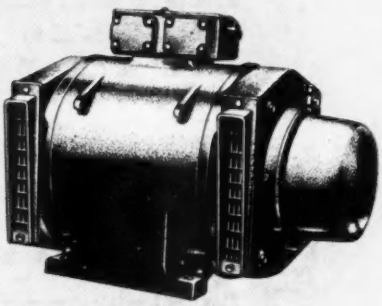
THURSDAY
7 JUNE
1951
NINEPENCE

They bear the name



G.E.C.





..and a name

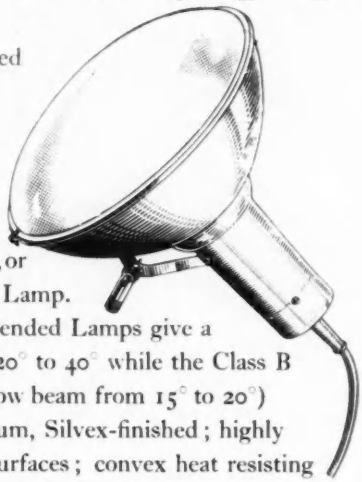
for RELIABILITY

G.E.C.

STANDARD INDUSTRIAL MOTORS

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY LONDON, W.C.2

the fiesta flood



A floodlight specially designed for celebrations and jollifications during the Festival year. The Fiesta-Flood will take a 300–500 watt General Service lamp, a 500 watt Class B2 Projector Lamp, or a 250 watt MBT/U Blended Lamp. (The General Service and Blended Lamps give a medium beam spread from 20° to 40° while the Class B Projector Lamp gives a narrow beam from 15° to 20°)

CONSTRUCTION: Aluminium, Silvex-finished; highly specular internal reflecting surfaces; convex heat resisting cover glass sealed to body by rubber gasket; two feet of three core T.R.S. cable; ¾" E.T. male thread conduit stem mounting

PRICE 82/6 ***Cover Glasses*** Red, green, blue and amber available 6/- extra

made for the occasion

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Simplex Electric Company Limited
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AWCO steel-cored Aluminium Conductor being unloaded at Wellington, N.Z.

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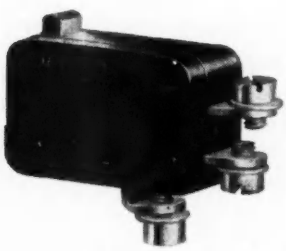
Throughout the wide field of modern electrical engineering there are no items of apparatus more versatile and dependable.

If you have not already done so, write for our new 30-page Catalogue No. 50/E.T.



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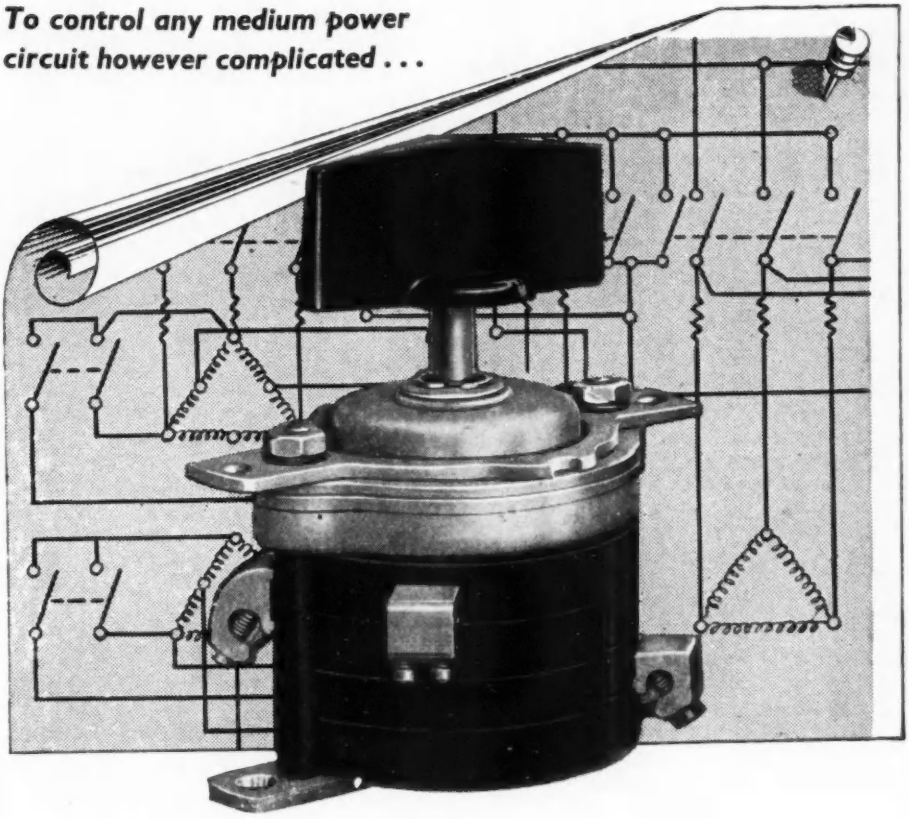

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SANTON switches have large, easily accessible terminals, plainly marked.

SANTON switches are available from 10-60 Amps. (180 under special conditions), any number of poles up to six positions—up to 660 volts.

SANTON switches can be delivered promptly and give years of trouble-free service.

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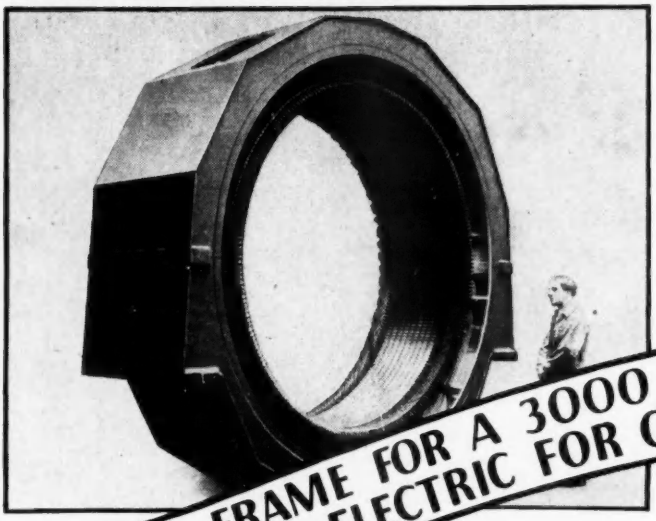

(3750 K.V.A. at ·8 power factor) 2400 volt 3-phase, 60-cycle, 300 r.p.m.

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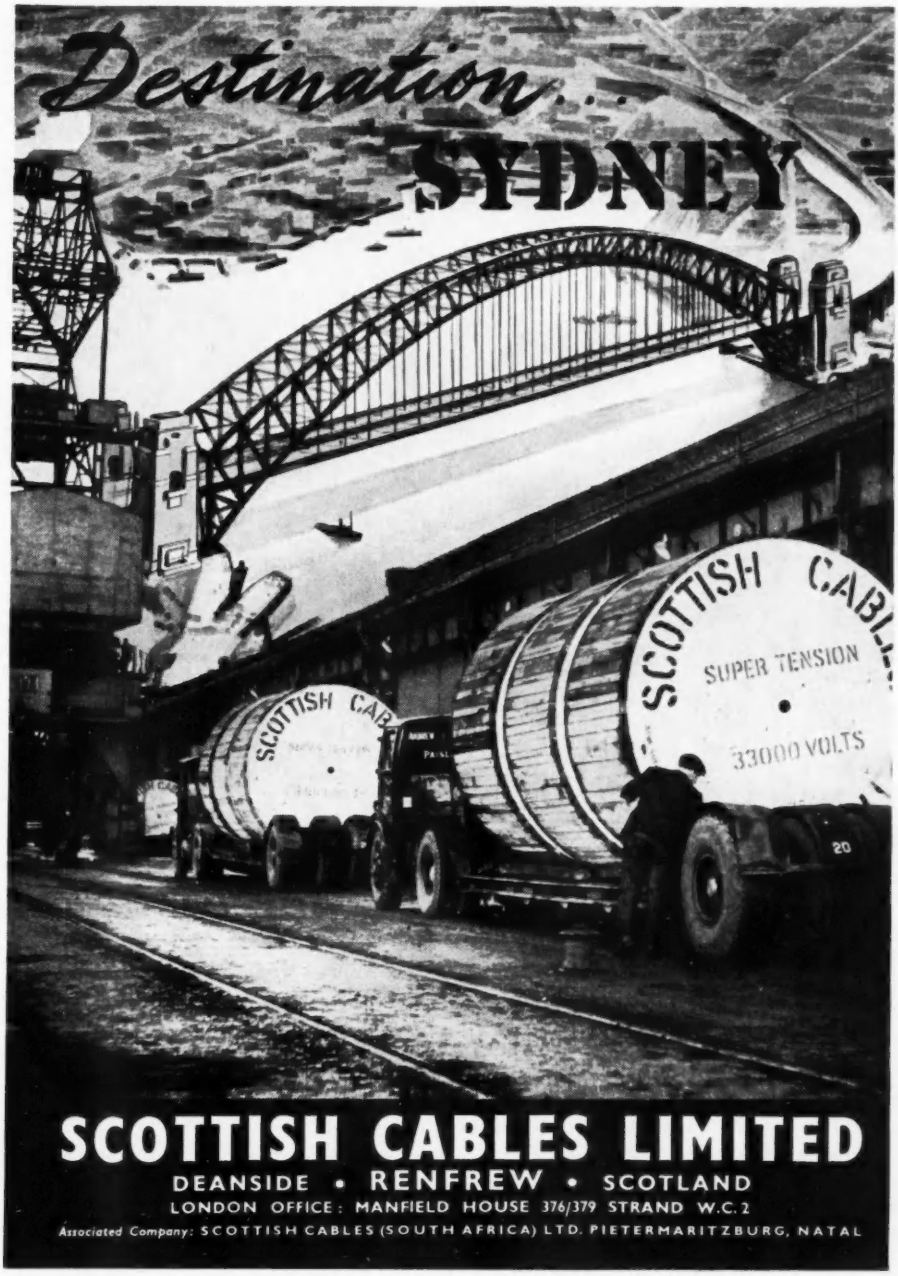
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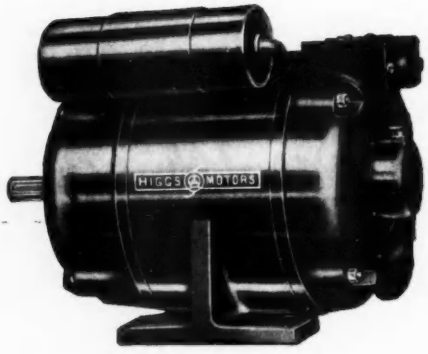

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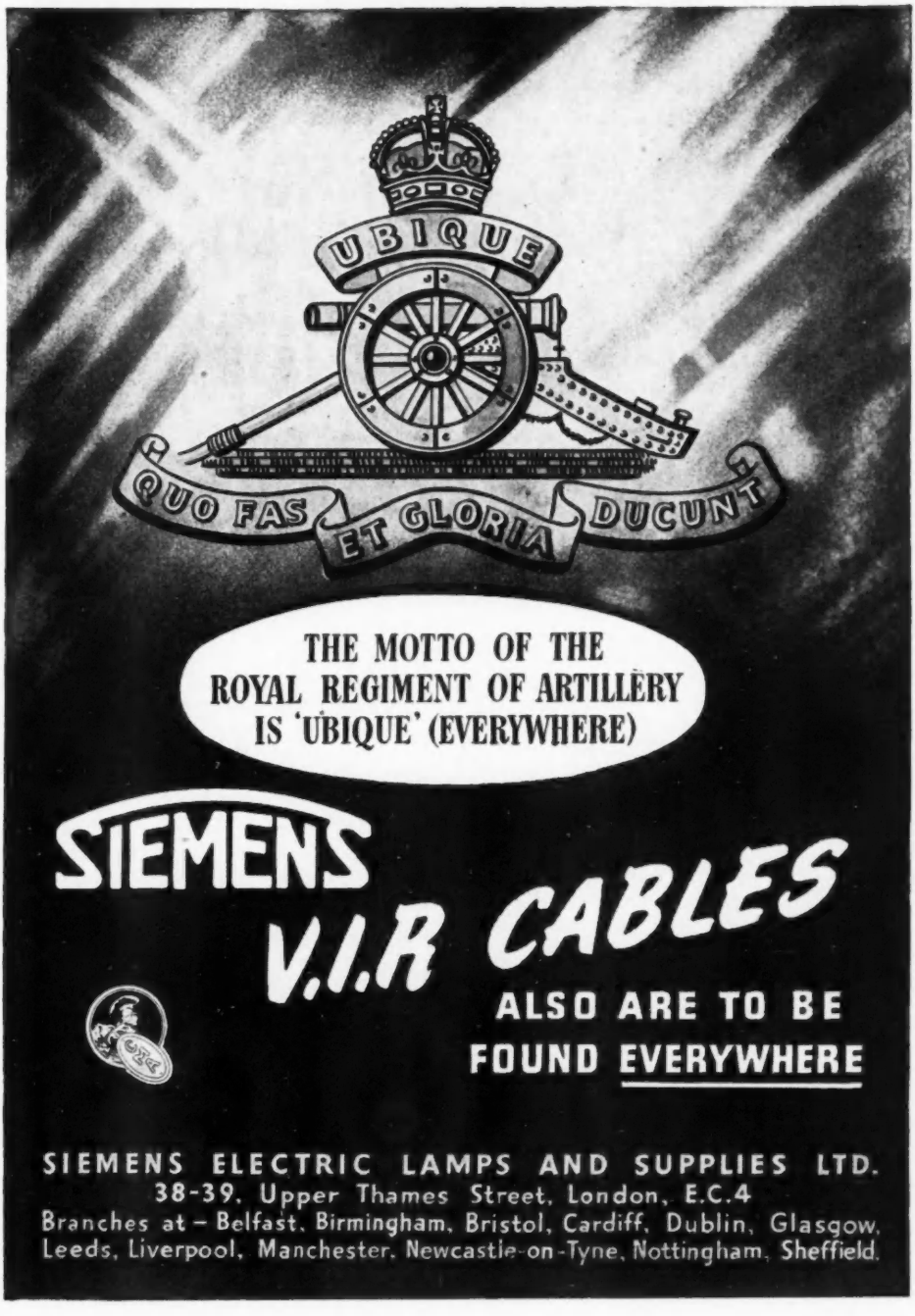
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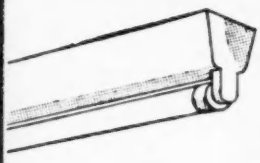

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Retail price—
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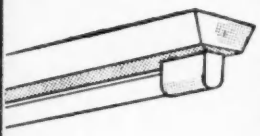
also **DD 400**
4ft. BATTEN
£3.10.0



Type
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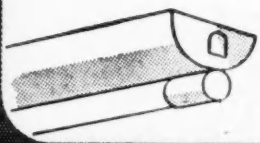
£4.12.6



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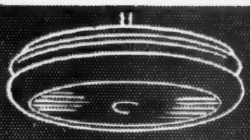
"Fluoradisc" 1001 £8.5.5



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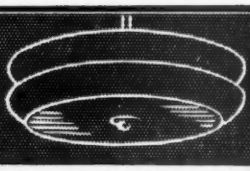

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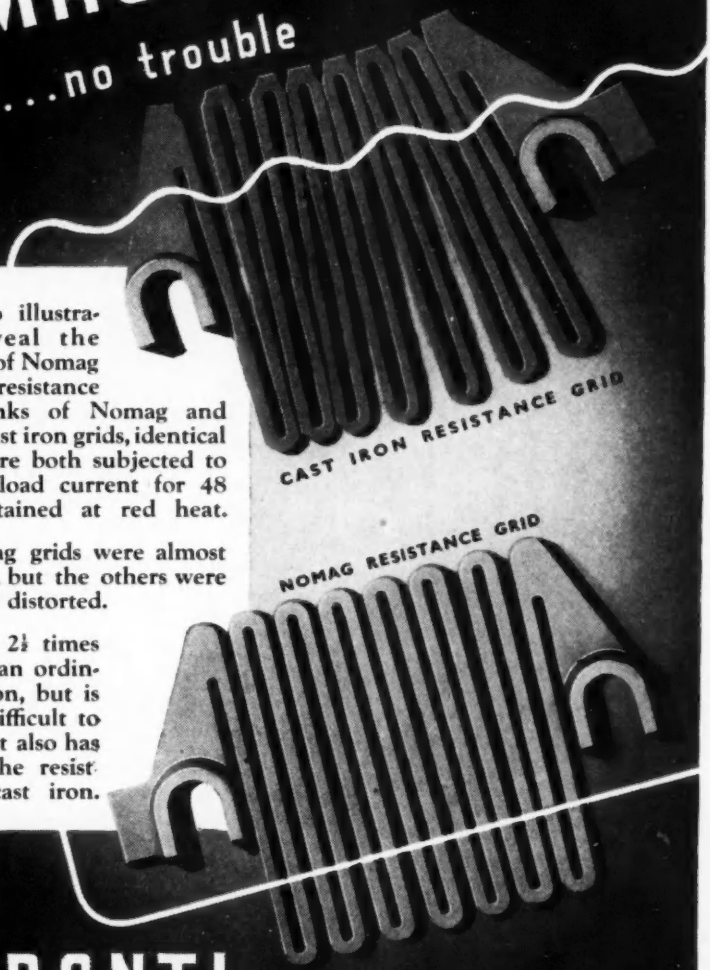
NOMAG...

...no trouble



These two illustrations reveal the advantage of Nomag applied to resistance grids. Banks of Nomag and ordinary cast iron grids, identical in size, were both subjected to 100% overload current for 48 hours, sustained at red heat.

The Nomag grids were almost unaffected, but the others were scaled and distorted.

Nomag is 2½ times tougher than ordinary cast iron, but is no more difficult to machine. It also has 1½ times the resistance of cast iron.

FERRANTI NOMAG

non magnetic CASTINGS

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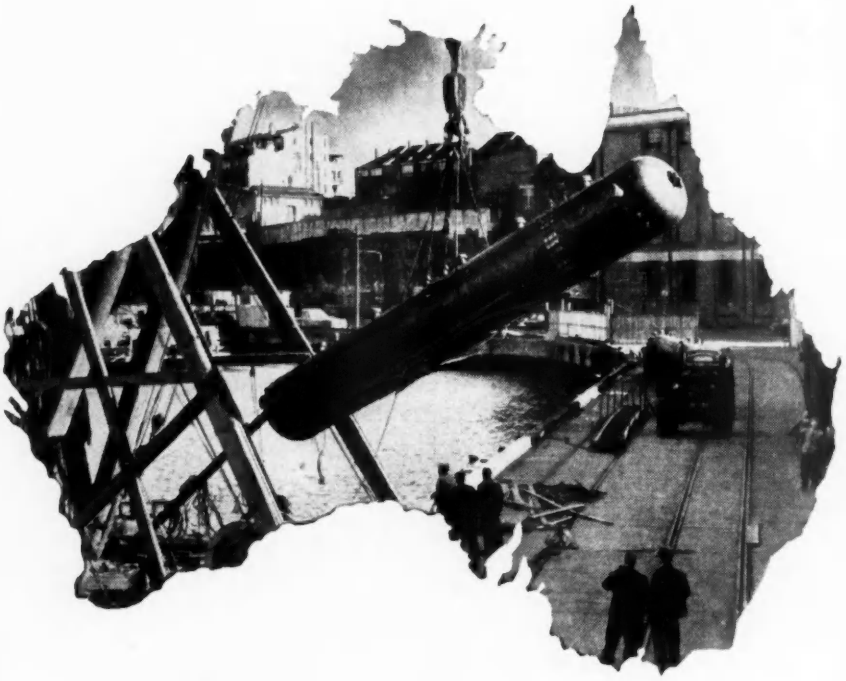
Going up . . .



down under

Steam-raising plant by Simon-Carves is helping to meet Australia's need for more electric power. The photograph shows a solid-forged boiler drum being unshipped in Sydney for the Bunnerong power station extensions, for which Simon-Carves are building two pulverised fuel fired boilers, electrostatic precipitators, coal, ash and dust handling plant, and a reinforced concrete chimney. The new Tallawarra power station in New South Wales is also being equipped with complete steam-raising plant by Simon-Carves

Steam power by **Simon-Carves Ltd** SIMON ENGINEERING GROUP

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The **B.N.E.**
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ask your moulder...

This is the first in a series of announcements designed to assist Buyers in purchasing plastics-moulded articles or components.

Amongst trade moulders, some specialise in the kind of products they make or in the materials they use. Again, some make only the smaller articles while others undertake jobs large and small. These are only two of many differences. In choosing a moulder your range of choice is largely, though by no means wholly, conditioned by the nature of your business and the nature of the job. Within that range arise other considerations, no less important. The status of your moulder will influence you. You will wish to know what skill and experience his staff could bring to bear on your problems. Quality counts — and price. You are certain to be concerned with reliability—that is, consistency of quality and regularity of deliveries.

Finally, you undoubtedly want to know the capacity of the moulder to understand *your* difficulties and requirements, and to co-operate with your own technicians and whether — once briefed — you could confidently leave it to him to work out the details and get on with the job.

Satisfy yourself first on all these points. If necessary get in touch with other customers and confirm that the required service *is* given. Then get down to your particular problem. Then talk price.

THE STREETLY MANUFACTURING CO. LTD., STREETLY,

If in doubt, ask **STREETLY**

The Streetly Manufacturing Co. Ltd. moulds in thermosetting and thermoplastic materials and specialises in long runs of highest quality mouldings.

A major percentage of its regular output is of moulded components for the electrical industry. If you have a moulding job in view, call in Streetly for practical, down-to-earth advice.

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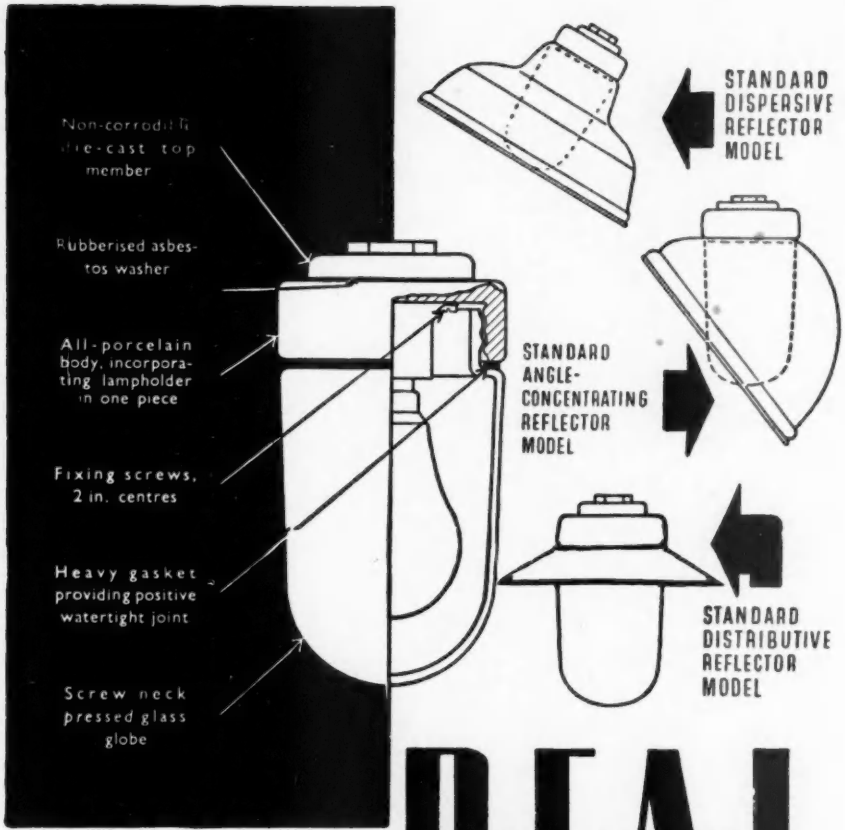
Non-corrodible die-cast top member
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Fixing screws, 2 in. centres
Heavy gasket providing positive watertight joint
Screw neck pressed glass globe
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Issued by ROWLANDS ELECTRICAL ACCESSORIES LTD., R-E-A-L WORKS, BIRMINGHAM, 18

METROVICK *at the Festival...*

... presenting Electrical Engineering at its best

The main exhibits are :

LONDON — South Bank Exhibition *

Power and Production Pavilion

¾th full scale model 60-MW turbo-generator set.

Transport Section (Marine)

Demonstration of "Seascan" Radar.

"The Sea"

Marine Gas Turbine (M.T.B. 5559), originally installed in gunboat No. 2009.

Transport Section (Rail)

10 mm. to 1 ft. fine scale models of the British Railways (Western Region) experimental gas-turbo-electric locomotive and typical electric freight locomotive for metre gauge.

Metropolitan-Vickers—GRS Ltd. will exhibit railway signalling equipment.

Hungerford Bridge Site

An actual electric locomotive, one of 65 ordered for the Manchester—Sheffield Line (Eastern Region) on loan from British Railways.

Dome of Discovery (Physics Section)

EM3 Electron Microscope.

Electroflux Magnetic Crack Detector. This will be wired for special demonstrations.

Display showing operation of Mass Spectrometer.

LONDON — Science Museum (South Kensington)

EM3 Electron Microscope, with typical microphotographs.

GLASGOW — Kelvin Hall Exhibition

250 hp. motor which can be started and reversed by visitors.

Tesla Machine (Hall of Future). This will provide a vivid "lightning" effect required for the dramatic display of natural power.

10 mm. to 1 ft. fine scale model gas-turbo-electric locomotive.

Automatic Metallic Arc-Welding machine with electronic control of arc.

Rotor for low-pressure cylinder of typical 52·5 M W steam turbine.

Metropolitan-Vickers—GRS Ltd. will exhibit railway signalling equipment.

BELFAST

"Seascan" Marine Radar ; a working demonstration with the aerial scanning the surrounding district.

LAND TRAVELLING EXHIBITION

Manchester, Leeds, Birmingham, Nottingham

Model of gas-turbo-electric locomotive, scale ½" to 1 ft, (sectioned).

Axial compressor from the "Beryl" jet engine—the rotor will be turning and the stator is part-sectioned.

* *Examples of modern street lighting and industrial fittings also on show.*

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED

Trafford Park, Manchester 17. *Member of the A.E.I. group of companies*

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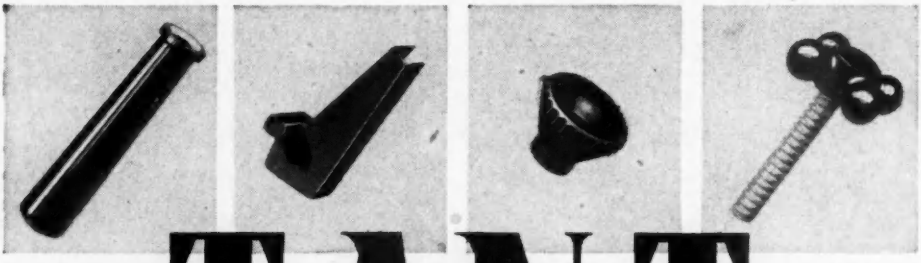

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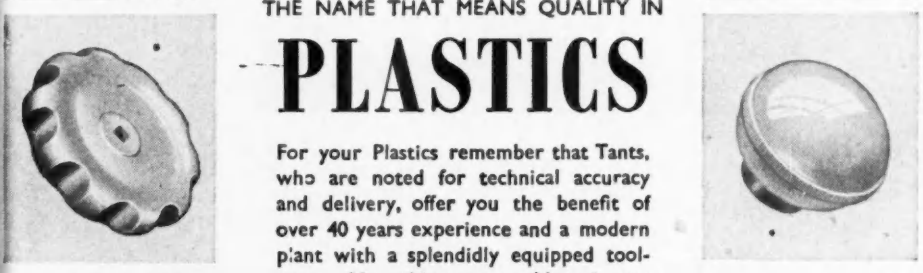
PLASTICS

For your Plastics remember that Tants, who are noted for technical accuracy and delivery, offer you the benefit of over 40 years experience and a modern plant with a splendidly equipped tool-room. No subject or problem is too difficult for them.



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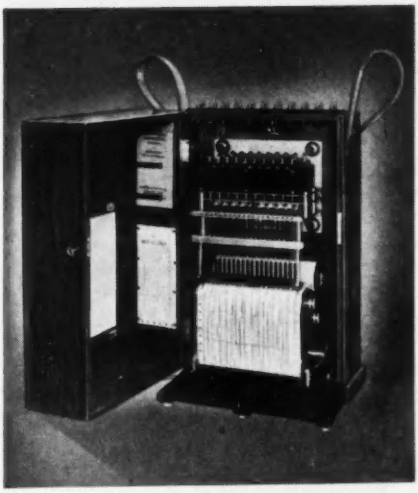
Eversheds Operation Recorders aid good management

Automatic Time and Quantity Records for Efficient Planning and Operation



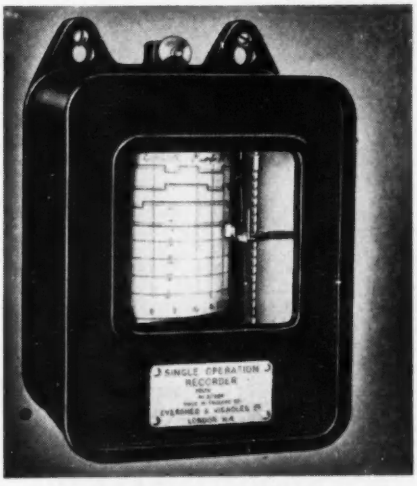
A Portable 20-pen Eversheds Operation Recorder used by the Post Office for recording the volume of telephone traffic on lines.

The first essential to sound management is to know the facts—the relevant facts at the right moment. Eversheds Operation Recorders provide automatically, in permanent, easily accessible form, these facts about the frequency and duration of any operation it is desired to study. They are widely used for keeping records of the stopping and starting of machines, or the opening and closing of switches. When required, operation details can be combined with a quantity record. Chart speeds can be adjusted to individual needs.

Eversheds Operation Recorders may have up to 20 pens recording on a single chart, thus enabling management to compare immediately the details of several pieces of apparatus.

Eversheds Operation Recorders are strongly made; their accuracy and reliability the outcome of Eversheds's fifty years' experience of developing equipment for centralised information and control.

Full details are contained in a new Eversheds Leaflet. Ask for Publication J.248.



A simple Single-pen Eversheds Operation Recorder for maintaining on a chart the complete history of a single operation. Very useful as a check on the operation of automatic plant and hand controlled apparatus that is in and out of use at intervals.

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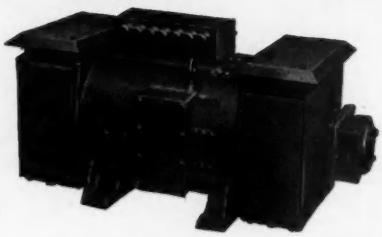

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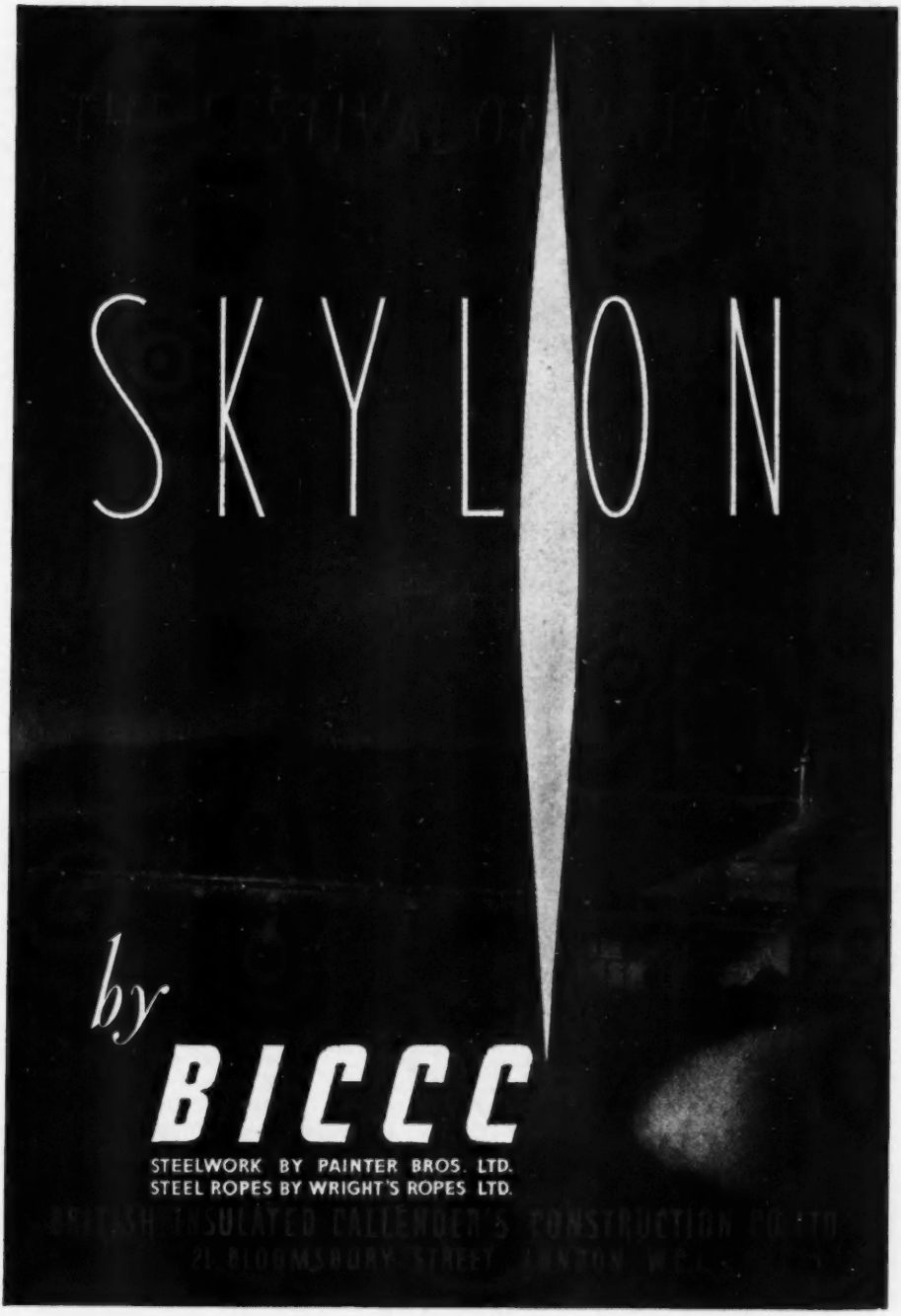
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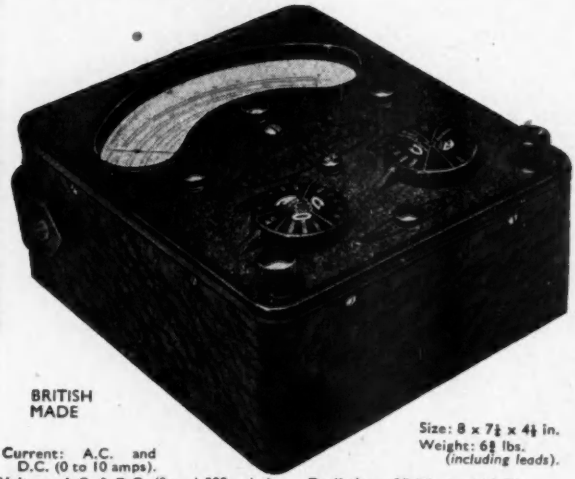

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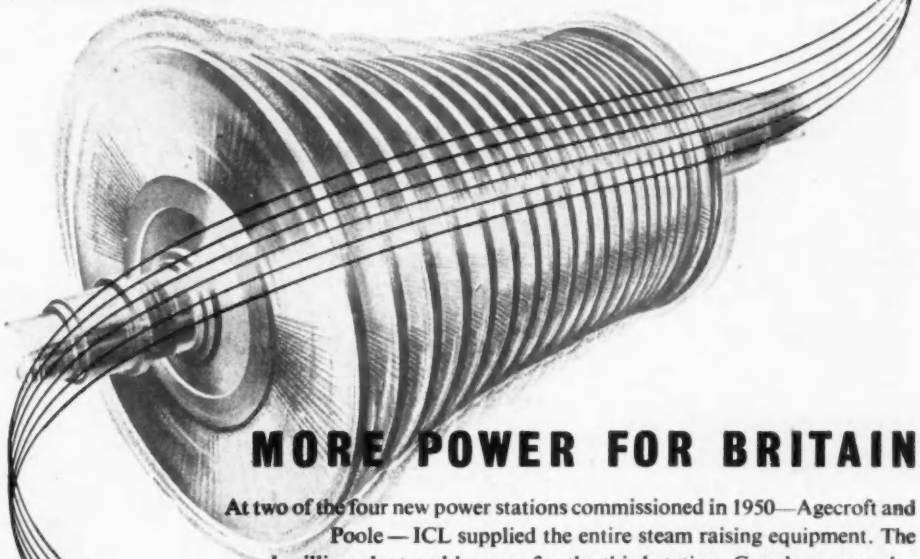

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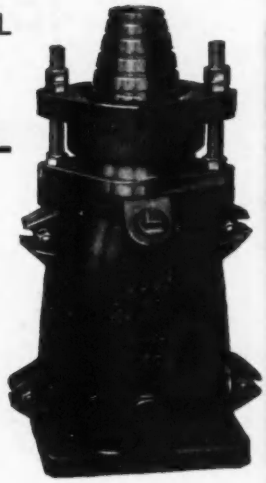

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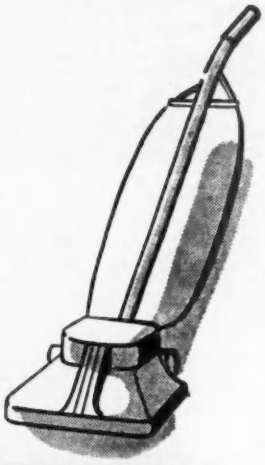

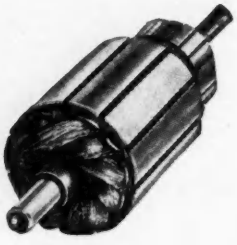

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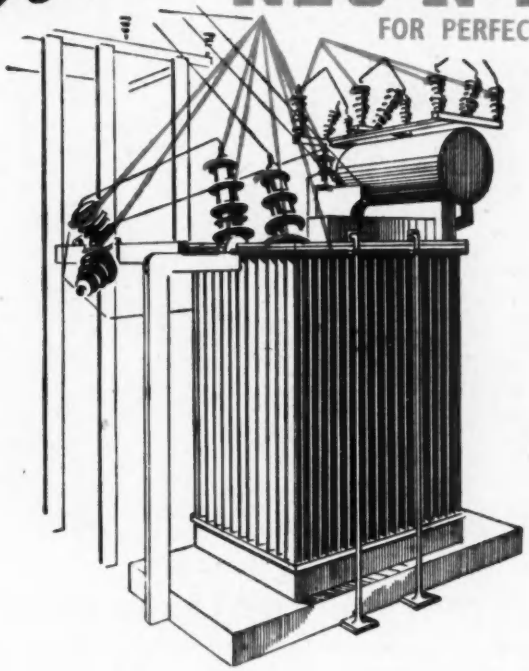

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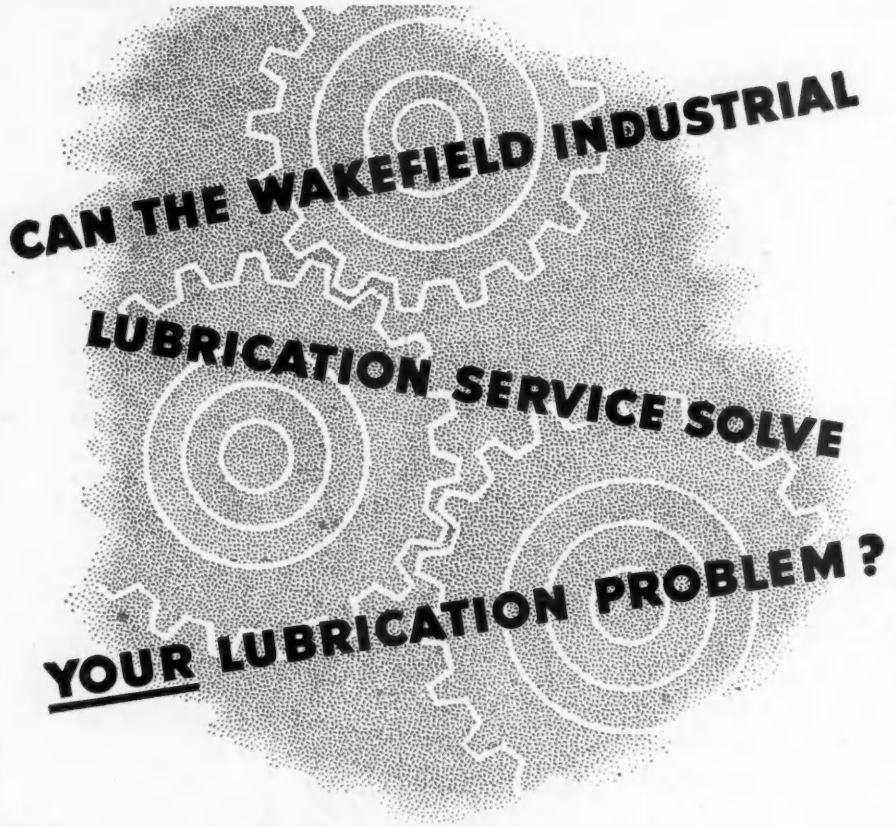

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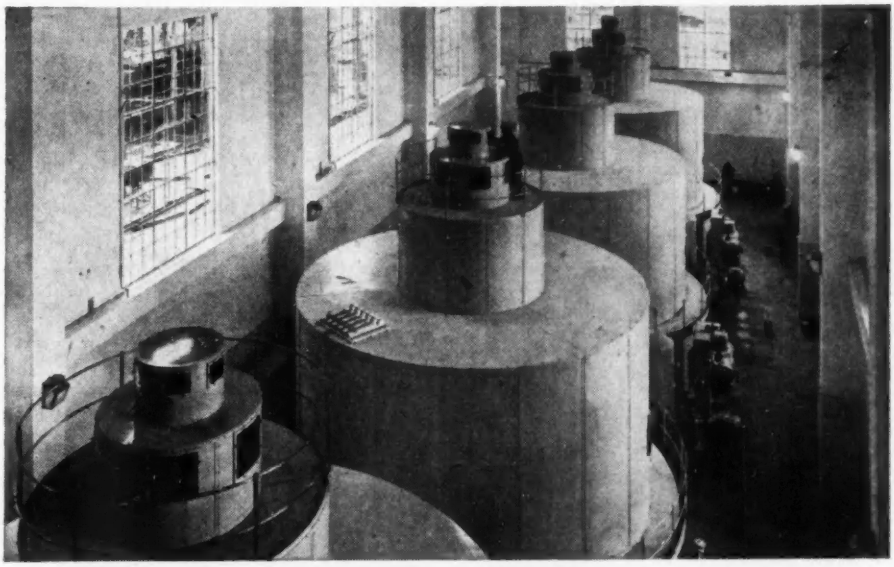

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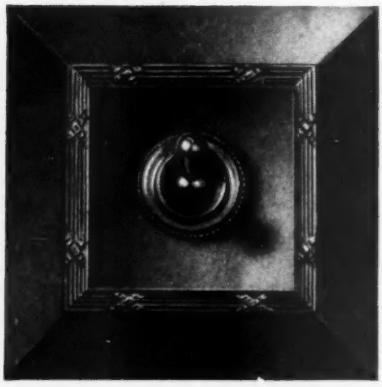

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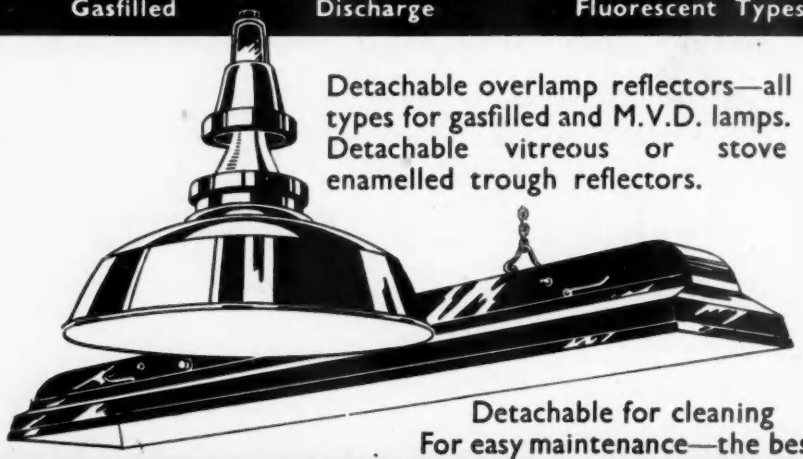

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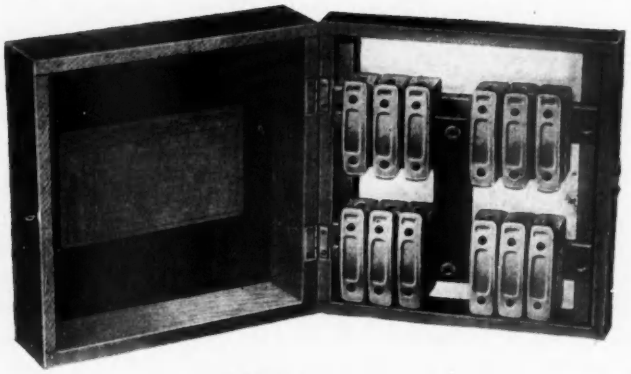

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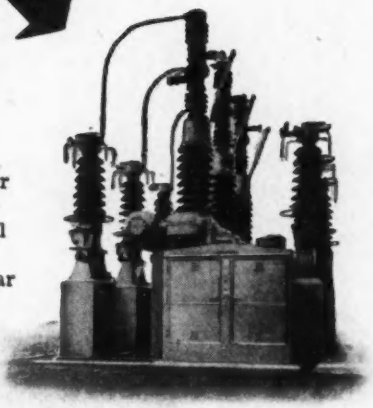

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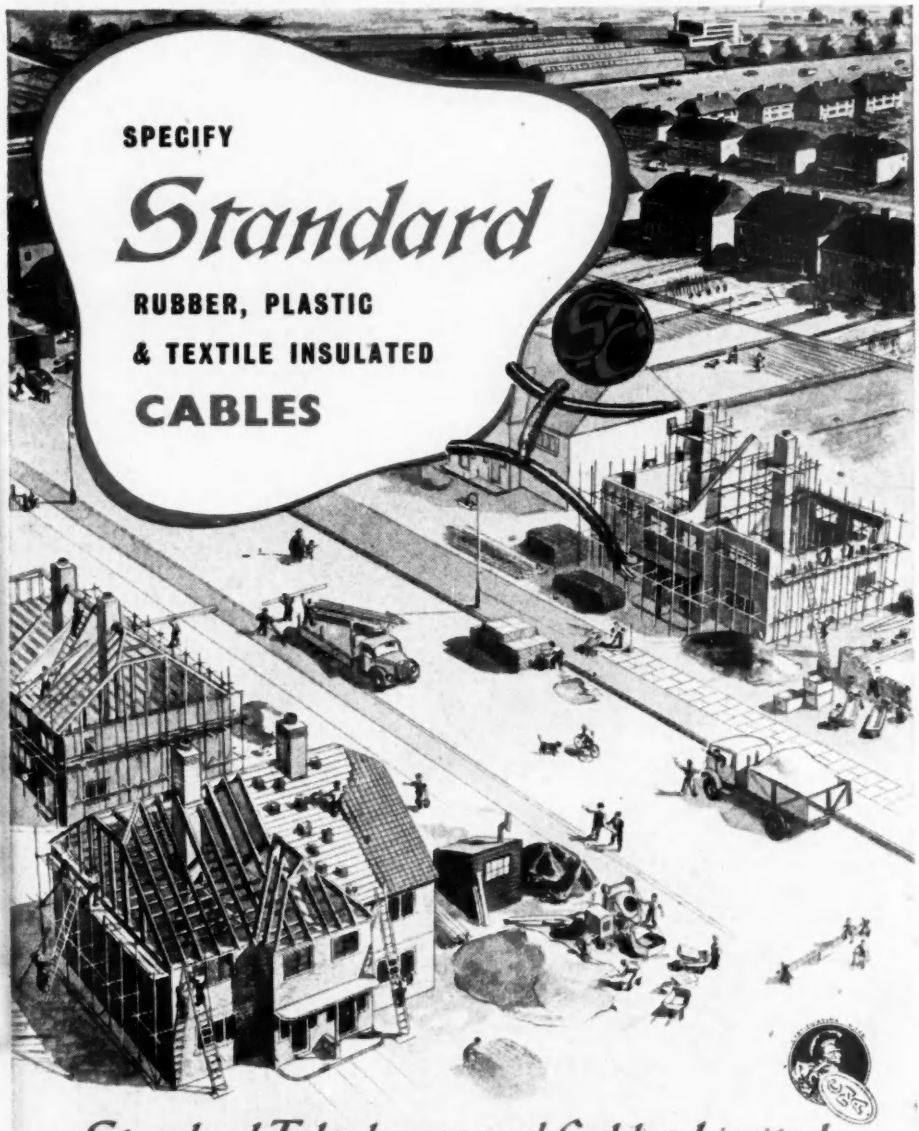

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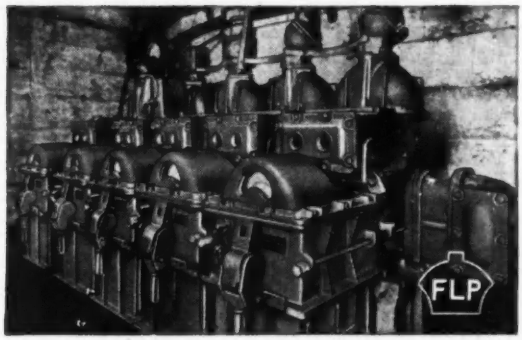

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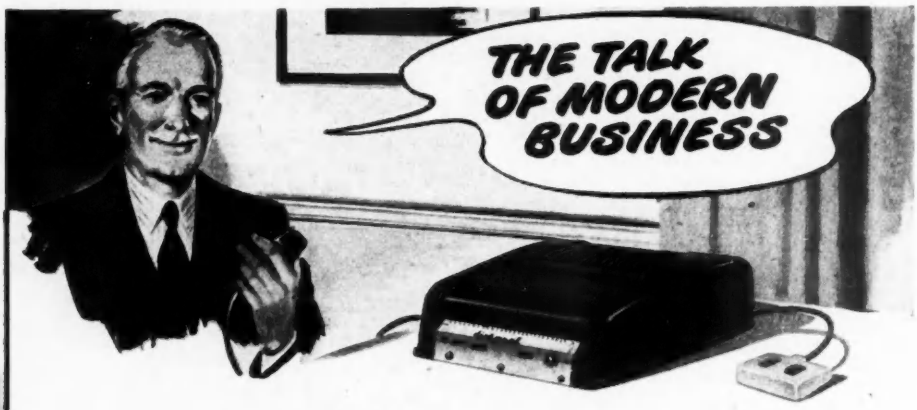

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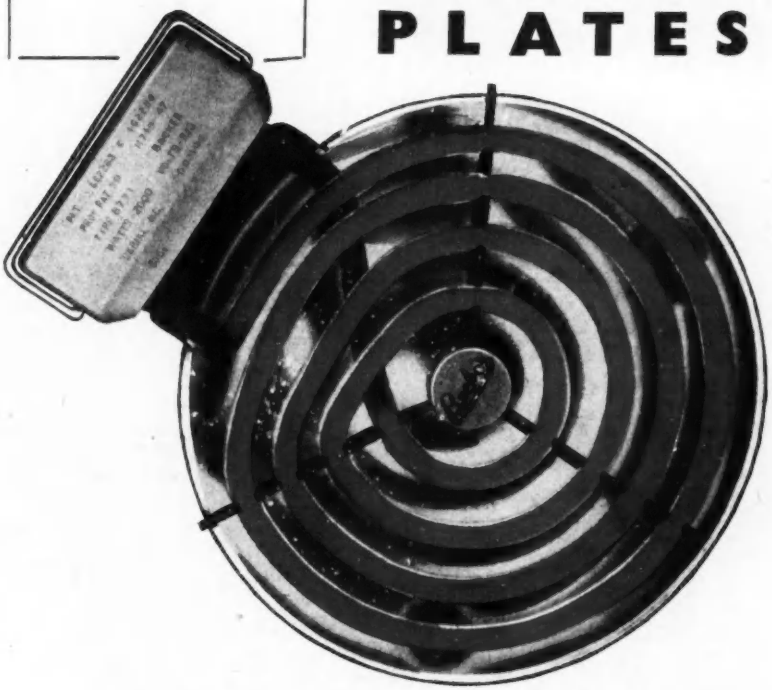

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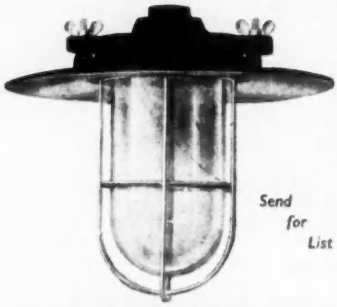

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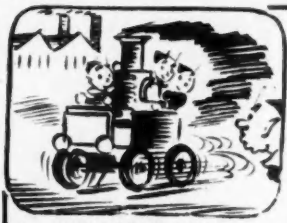

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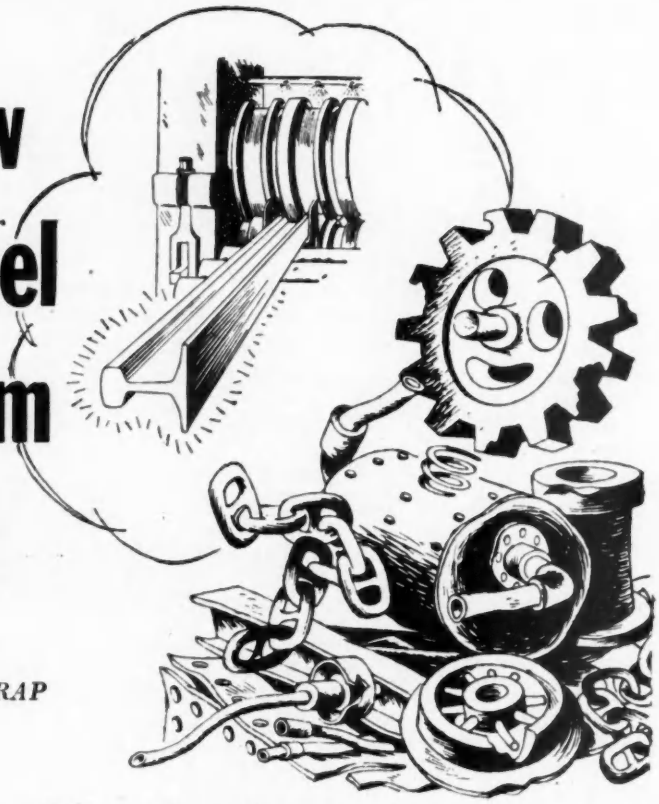

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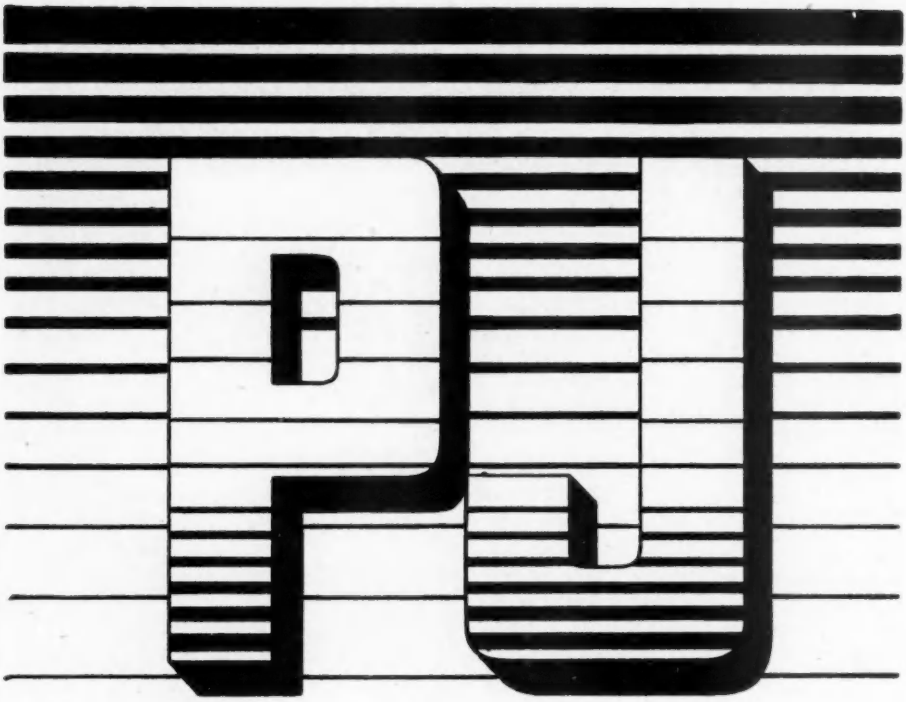

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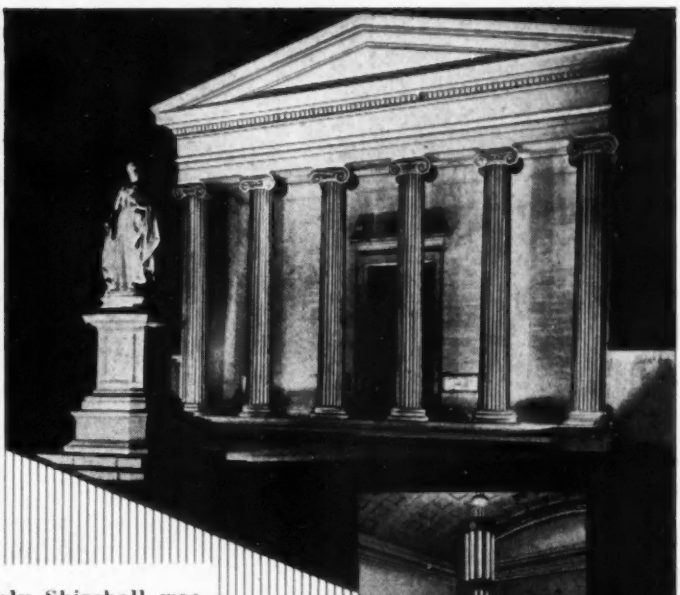

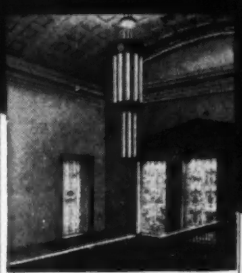

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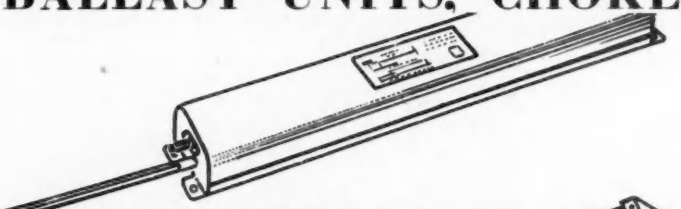

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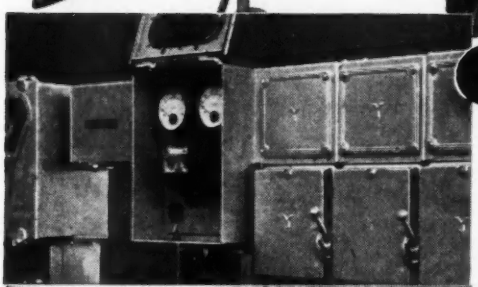

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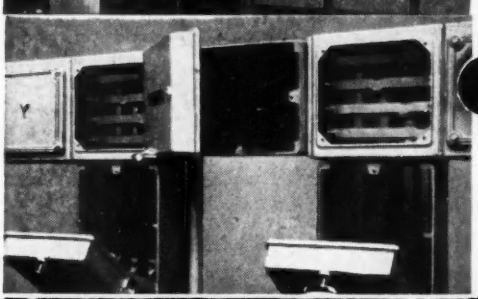

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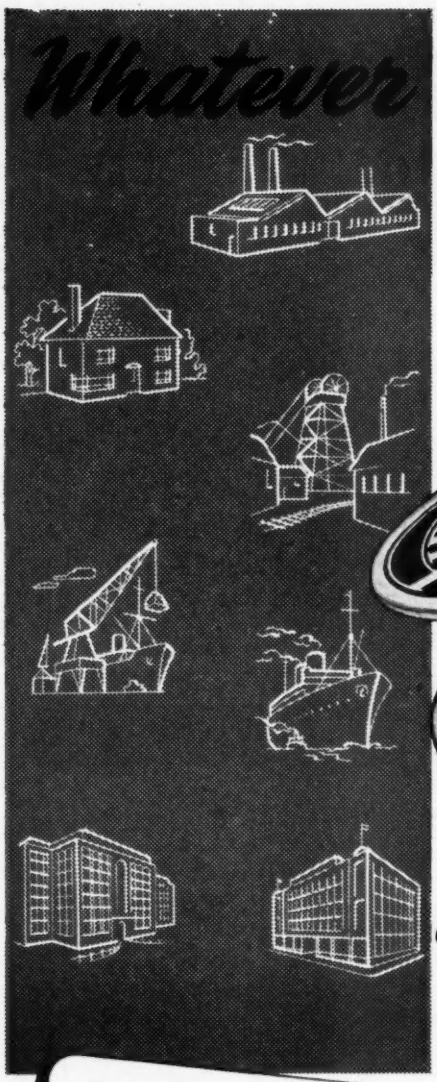

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ELECTRICAL TIMES

Vol. 119 No. 3109 THURSDAY 7 JUNE, 1951

PUBLISHED EVERY THURSDAY

SIXTIETH YEAR OF PUBLICATION

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Editorial

THE NEW PRICE

EVERY week in our pages there is being told the too familiar story of rising prices and now unfortunately our own journal has had to follow the same inevitable trend. Paper, the raw material of publishing, is two and a half times what it was twelve months ago and for each copy the cost of paper alone had reached a point where it substantially exceeded the price that the reader pays. In such circumstances and with a considerable circulation to maintain, an increase in selling price was plainly unavoidable. The ELECTRICAL TIMES has always aimed at providing the reader with full coverage of electrical news and technical information; this will continue to be our object, and the higher price will enable us to expand those features which have recently been somewhat curtailed. We cannot but take advantage of this opportunity of thanking our readers for their continuing support, and for the helpful suggestions and comments that we receive from time to time. These are of the greatest value in the difficult task of catering for the many different sections of our great industry.

THEY CAN COME IN

ELECTRICITY consumers had an interest in the recent Court case in which the Eastern Gas Board were sued for damages for trespass after an inspector had broken into an unoccupied house to read the meter and collect the cash. The wide reporting, in the daily Press, of the judgment in favour of the gas board, has made many users of electricity wonder how they stand in similar circumstances. From a study of the relevant statutes it seems that electricity board officials have a corresponding right to enter premises, and that in their case, this right is subject to fewer restrictive provisions. Whilst the electricity board officer, like his gas board equivalent, must enter at a reasonable time, and repair any damage he may cause, he is not specifically required to "produce some duly authenticated document showing his authority." In the recent lawsuit, the plaintiff based his case principally on an argument concerning this authenticated document, and on the meaning of the word "produce." No such approach, based on a specific statute, would seem possible in a case involving an electricity board. Moreover, whereas the Gas Act carefully differentiates between access to inspect fittings, and access to cut off the supply, no such distinction exists in the governing electricity statute. This fact would seem to provide an additional defence for any electricity board whose right to make forcible entry is questioned. Incidentally it is of interest to note that the gas nationalisation Act of 1948, which introduced the questioned words concerning the production of a document, codified such provisions relating to gas supply, but that no such recasting of existing provisions was attempted in the 1947 Electricity Act, although such a refurbishing of electricity law has long been discussed.

COAL PRICES

HOUSEHOLD coal, under the new scheme announced by the N.C.B. last week, is to be graded into eight groups, and the price of each group will be the same throughout any one of the sixty consuming zones that cover the whole of Great Britain. This scheme appears at a time when a new price schedule, based on quality, has been prepared for industrial coals, and is being discussed with the consumers' councils; in such circumstances, any hint of prevailing N.C.B. ideas has a special interest. The averaging out of coal transport charges over large areas is to some extent a new principle, since it involves abandonment of

the practice of having a fixed pit-head price for a given coal. There is no indication that some similar price-zoning plan is to come for industrial supplies, and such a scheme would certainly be highly controversial in its application to individual manufacturers. It must be appreciated, however, that such an arrangement for the averaging of fuel transport charges now applies, via the bulk supply tariff, to area board purchases of electricity, and that a further precedent is now being added to this for consideration by planners of fuel policy. A second point about the new household coal scheme is perhaps the more immediately important. As a result of the price adjustments, the N.C.B. is expected to lose £1·5 M per year in revenue. If this is recouped by arranging for the new industrial prices to yield more, the customer will almost certainly lose in the long run. This fact should be well marked by those reviewing any new proposals.

WHOLESALE TRIMMING

THE main criticism most people would make on Mr. Penwill's E.C.A. paper was its position on the programme. The trading structure of the industry presents such a wealth of opportunity for discussion that it seemed a great pity to tuck it away at the end of the day, when even the stoutest debaters are beginning to flag, and the thoughts of many delegates are fixed on tea rather than technicalities. It would, for example, have been interesting to hear the views held by the wholesalers on Mr. Penwill's proposed reduction in their discount and the addition of a series of quantity discounts. At first thought, it seems that such a course would be welcomed by the reputable wholesaler, since it would be another nail in the coffin of the "brass plate" merchant who exists merely as a discount-taker, giving nothing in return. It is, however, by no means certain that it would be welcomed throughout the industry. Many wholesalers carry stocks of items for which there is not a heavy demand, more as a service to their customers than with the idea of making profits. The proposed terms would render the handling of these lines not merely unprofitable but definitely uneconomic, and no wholesaler, no matter how public-spirited, can afford to pay for stock, depreciation, handling and delivery charges, overheads and credit facilities on more than a few items which do not even begin to pay for themselves—so out they would go. To the wholesaler in fact, it would mean little more than the enforcement of a decision on a question he has probably debated many times before—the pruning of a certain amount of dead wood.

Whether his customers and the manufacturers would all see it in the same light is another matter.

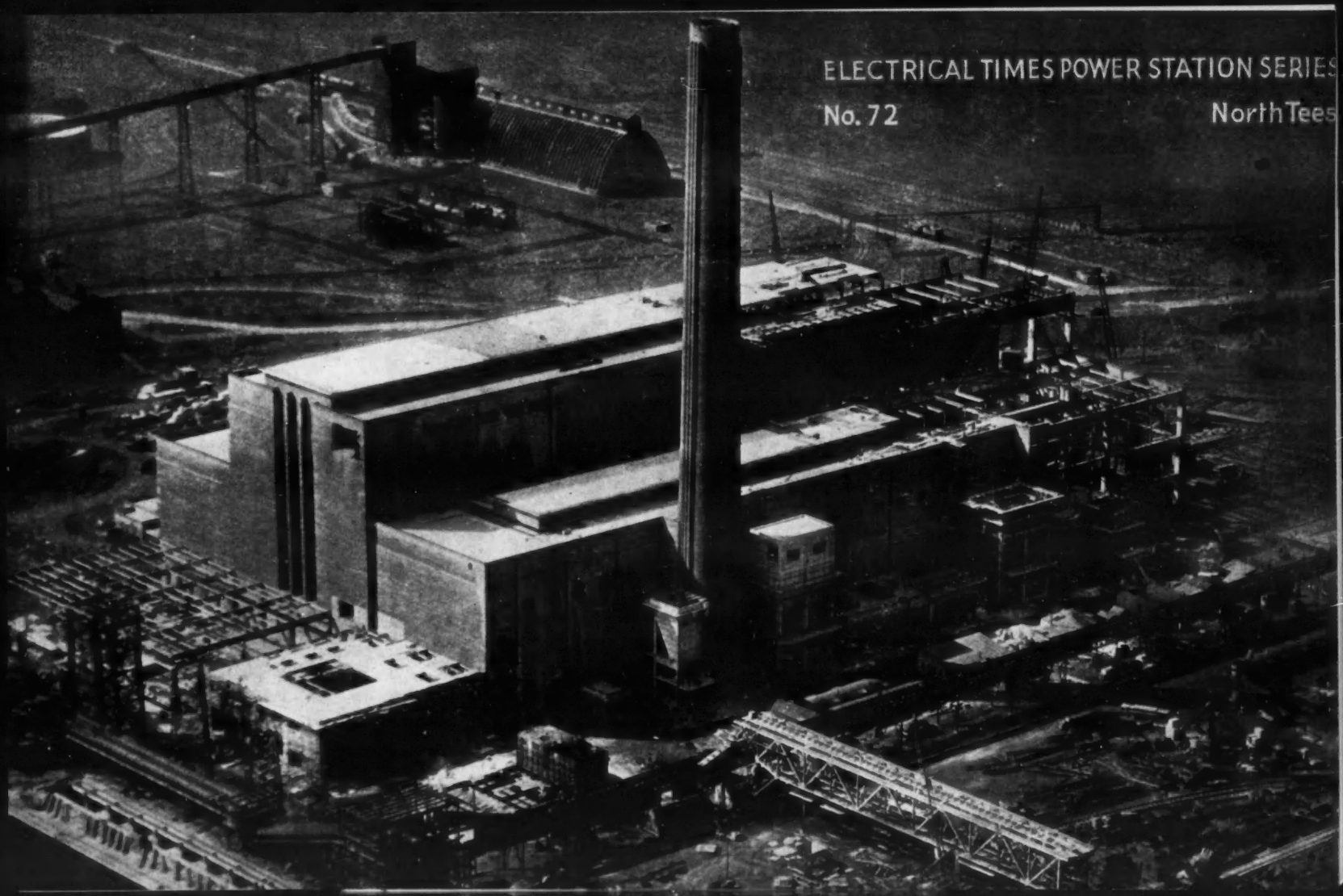
Meteor

THIS WEEK'S PHOTO

NORTH TEES 'C' power station will be the first post-war power station to be commissioned in the North Eastern Division of the British Electricity Authority. Construction of the station was initiated by the North Eastern Electric Supply Co., the site being adjacent to the existing North Tees station. Older reader's will remember that station as being notable for its then very advanced steam conditions. The new station lies on the North bank of the River Tees and is expected to be in partial operation by the last quarter of this year.

The station is to be equipped with four Parsons turbo-alternators having a C.M.R. of 60 MW and an economic rating of 48 MW. The boiler plant is manufactured by Babcock and Wilcox and comprises 7 x 360,000 lb./hour units with pulverised fuel firing. The turbine stop valve steam conditions are 900 lbs/sq. in. and 925° F. There are four high-pressure and one low-pressure feed heaters and the final feed water temperature is 370° F. Cooling water for the condensers is obtained from the River Tees and the normal vacuum is 29 in. Generation will be at 11 kV and the alternators are hydrogen cooled; each unit is equipped with an 11/66 kV step up Parsons transformer. All switching will be carried out at 66 kV, with Reyrolle air blast circuit-breakers. The existing 132 kV Grid connection to Norton is adequate to meet the demands of both stations.

The station is designed to burn Durham and Northumberland coal. Ship transport will be used and there is provision for discharging ships of up to 5,000 tons. The coal storage site has a capacity of 85,000 tons and will be equipped with the most modern handling plant. Tipping at sea will be employed for ash disposal.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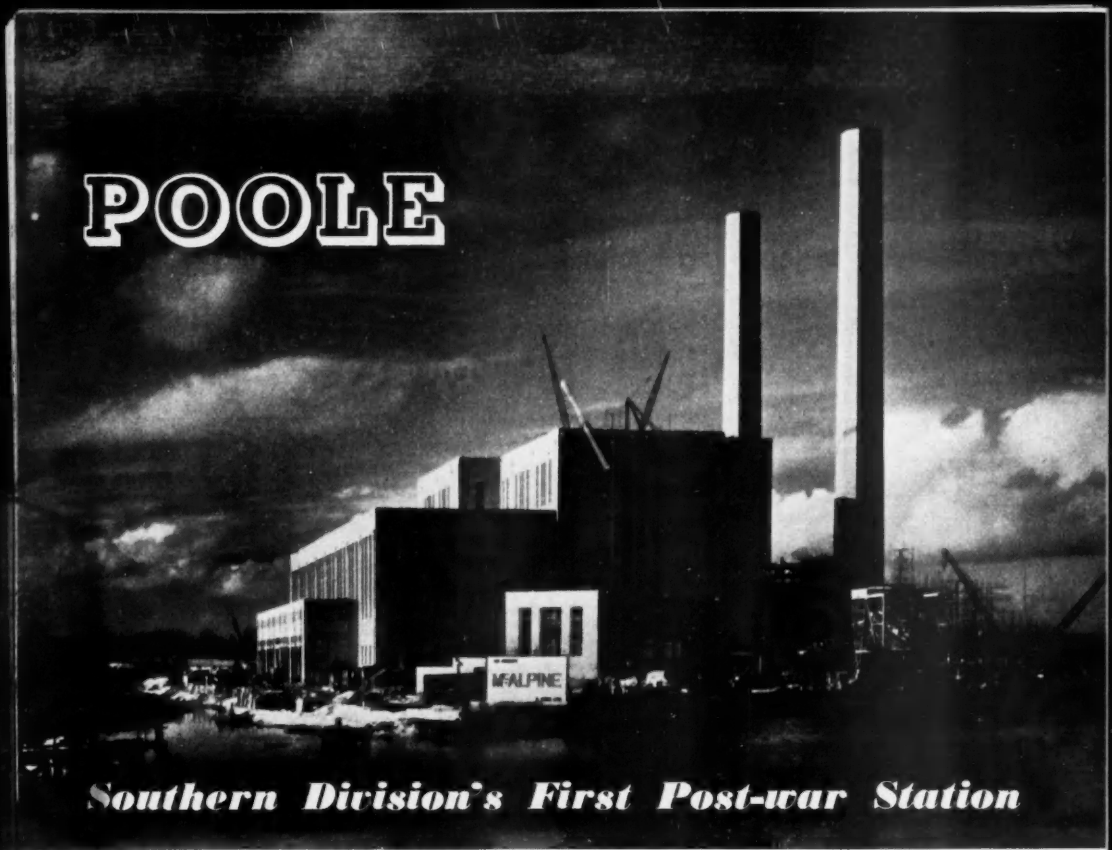
North Tees



Southern Division's First Post-war Station

LOCATED on reclaimed land, the new power station at Poole provides an interesting example of modern civil engineering techniques. Originally, the proposal to utilise this rather difficult site emanated from the old Bournemouth and Poole electricity undertaking before World War II. The onset of hostilities, however, held up active work until the post-war period, although some trial borings had been carried out in 1939. In 1946, approval was received to install three 50 MW turbo-alternators and six 300 klb/hr boilers, and in the following year, this was extended to cover a further turbo-alternator and two more boilers.

The site, located alongside the narrow channel connecting Poole Harbour to Holes Bay consisted originally of saltings covered at each high tide. Boreholes showed the substrata to consist of a great variety of sands and clays. In order to allow colliers of up to 1,500 tons to berth at the coal wharf, the existing level of the river bed has been dredged to – 21·5 o.d. The coal wharf itself consists of concrete shells within steel sheet pile cofferdams, while the ash wharf is a concrete and steel structure anchored by 65 ft long steel box-piles, filled with concrete. The 132 kV substation, along side the power station, was built of concrete beams and piles, the switchgear being carried on steel frameworks, anchored to the beams. For the power station itself a mass concrete foundation was used. In laying this foundation a girdle wall was first constructed between two rows of sheet piling. The top of this piling was kept at high tide level. Inside the protected area, mud was removed to a depth of about twenty feet, and concrete was then mass poured.

Where no appreciable building loads had to be carried the site generally was brought up to a level above the high water mark by tipping ashes and chalk. Other buildings and structures such as the stores, electrostatic precipitators, canteen, chimneys, coal transporter gear, water softening plant and the control room were carried on reinforced concrete piles.

Building Structure

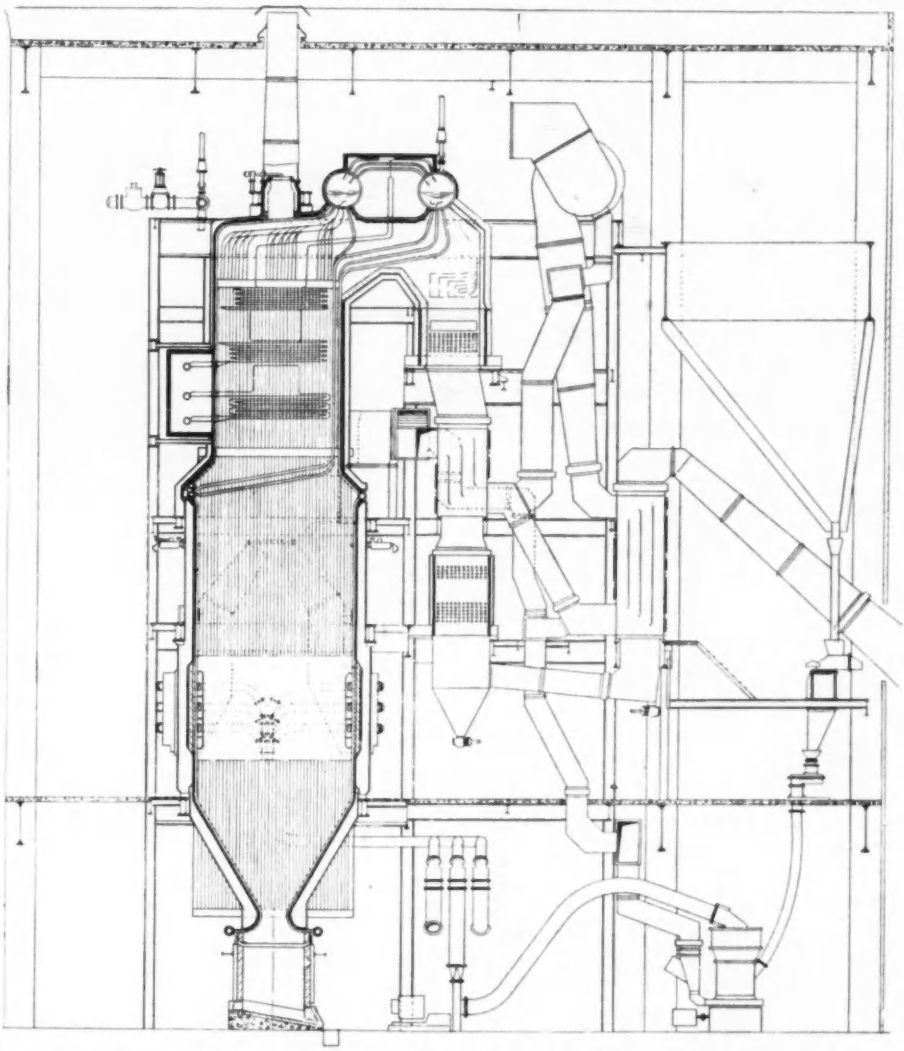
The two chimneys are octagonal in shape and are constructed of reinforced concrete. They are over 300 ft high and the wall thickness tapers from 20 in. at the bottom to 6 in. at the top. The mean outside diameter at the top is about 21 ft. For aesthetic purposes a buff coloured Portland cement was used in the mix.

The boiler house and turbine house are most impressive, the height of the building being

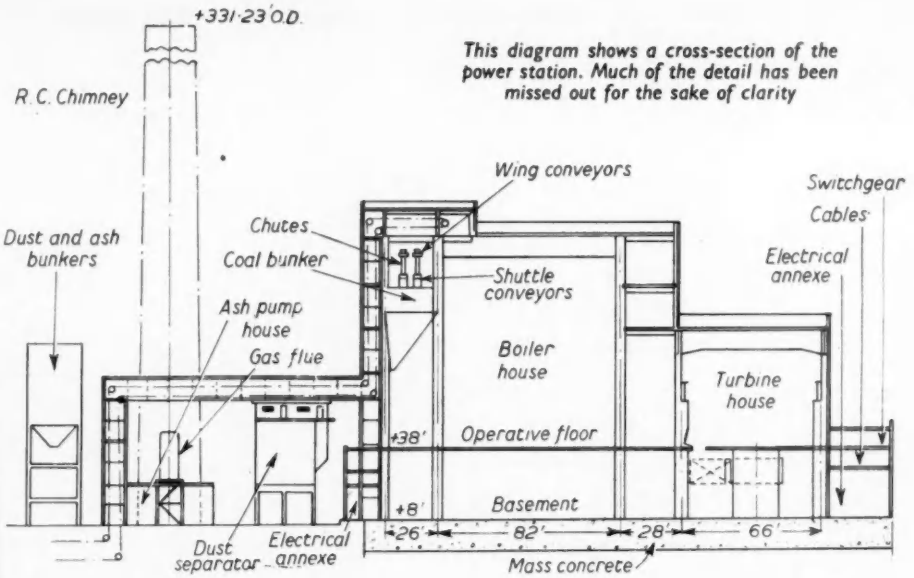
somewhat greater than in the majority of stations. Local bricks from a Poole brickworks have been used, and these, which are unusually light in colour, harmonise most pleasantly with the chimneys. The same brick has been used in the construction of the ancillary buildings, of which the largest is a four storeyed structure at the west end of the station, which houses the offices, workshops and stores.

Coal Handling Plant

Coal is delivered exclusively by collier, and mainly supplies will come from the South Wales coalfield. A special fleet of B.E.A. colliers has been built for this service of which the first S.S. *Poole Harbour*, completed her maiden voyage in April 1949. Coal is off loaded by two electrically operated Stothert and Pitt cranes fitted with 3¾ ton Priestman grabs. These transfer the coal to a belt conveyor system running parallel to the wharf, and this conveyor transfers to a further conveyor system running the length of the coal store. This latter conveyor system is arranged to deliver directly to the filler pits of a twin-gravity bucket conveyor



Sectional drawing of the International Combustion pulverised fuel boiler as installed at Poole



This diagram shows a cross-section of the power station. Much of the detail has been missed out for the sake of clarity

feeding direct to the bunkers, to the running coal store, or the emergency coal store, as required. Reclamation is carried out by a large transporter running the whole length of the coal store. This is equipped with crane and grab and discharges via travelling hoppers on to the required conveyor systems. The belt conveyors have a handling capacity of about 200 tons/hour, but the gravity bucket conveyors which lift the coal to the boiler house hopper feed level are rated at 135 tons per hour each. The feed for the bucket conveyor passes below the running coal store in a tunnel, at the power station end of which is the weighing plant. From the boiler house hopper, the coal passes down to the pulverisers, whence it is blown into the furnace burners. The air supply is preheated and external fans after the pulverisers are used.

Boiler Plant

The boilers are in line units, two per turbo-alternator, each rated at an output of 300 klb/hr at 950 lb/sq in. superheated to 940°F with feed water at 370°F. They are fitted with tilting corner burners to enable control of the superheat to be exercised. Attemperator control is also fitted, together with remote control soot-blowing equipment. Combustion air is supplied to each boiler by two forced draught fans of the two-speed vane controlled type mounted in the upper part of the boiler house, and the burnt gases are extracted by two induced draught fans. Each forced draught fan is driven by a 135 b.h.p. motor and each induced draught fan by a 230 b.h.p. unit. After passing through the superheater and economiser banks, the flue gases have further heat extracted from them by plate type heat exchangers which heat up the primary and secondary air intake. After passing through the heaters the gases go to the precipitators and are then discharged to the main flue. The heating surface of each boiler, including the water walls, is 9,578 sq ft; area of the superheater and economisers (2 per boiler) being 14,550 and 72,086 sq ft respectively.

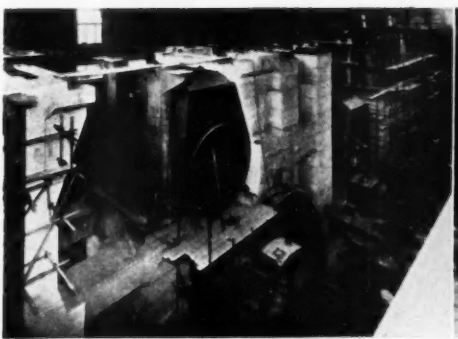
Three Lopulco mills per boiler are installed, each having a capacity of 21,000 lbs/hr (8% moisture) or 18,500 lb/hr (15% moisture). The air used for blowing the fuel into the furnace is heated to a temperature of 430°-484°F. At full load, the fuel combustion rate is about 15 tons/hr.

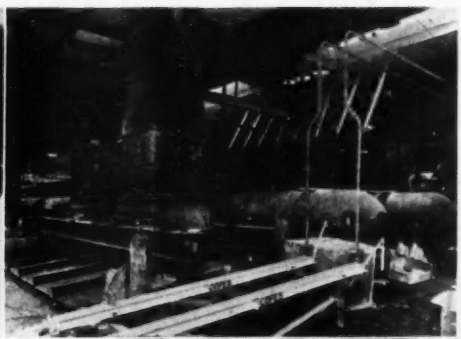
Although the maximum continuous output is 300 klb/hr, with a normal rating of 240 lb/hr, in fact the boilers have a considerable margin in hand and appreciably higher outputs have been attained.

Turbines

The station is comparatively unusual in that the turbo-alternators are made by two different manufacturers, two being by C. A. Parsons and two by Metropolitan-Vickers Ltd. These machines are similar in several ways in as much

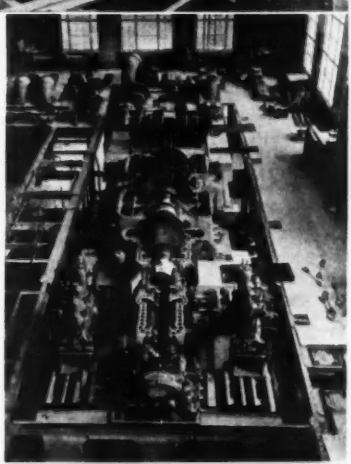
as they are all working at the same stop valve pressure and temperature of 900 lb/sq in. superheated to 925°F, have five bled steam points for feedwater heating, run at 3,000 r.p.m. with geared exciters running at 1,000 r.p.m., generate at 11·8 kV and are three cylinder tandem machines. In most other respects the machines differ, the Parsons sets being of the "reaction" type while the Metropolitan-Vickers units are impulse and reaction. This difference leads to an immediate variation in the rating, the Parsons units having both a maximum continuous rating (m.c.r.) and a maximum economic rating (m.e.r.) of 50 MW, while the Metropolitan-Vickers sets are rated at 50 MW m.c.r. and 40 MW m.e.r. Other major points of difference are that Parsons have used their flange clamping system on the

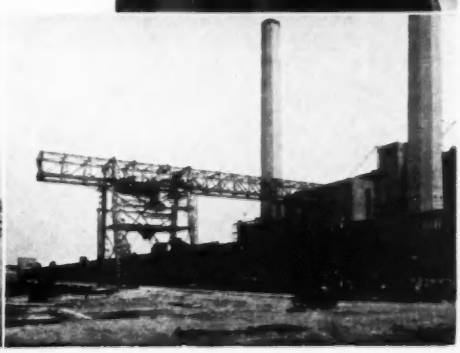




POOLE IN THE MAKING

Top left is the M.V. foundation block showing constructional details while top right can be seen the top boiler drums. The two makes of machine are shown centre: left is Parsons (No. 3) and right M.V. (No. 1) set in erection. The views below are of the coal jetty and the coal handling gear





h.p. cylinder, while M.V. have retained the through bolts, and Parsons have a single shell divided condenser, compared with M.V.'s twin shell unit. There are of course an infinity of differences in other sections of the design, and it will be particularly interesting to compare the running characteristics and performances of the two types when they have settled down.

In accordance with modern practice, the four machines are in line, the two pairs of steam ends being together. The two M.V. sets are located together at the west end of the turbine house, while the two Parsons are at the east end.

An unusual point mentioned above is the driving of the exciters through a 3 : 1 reduction gear. It would seem that at long last the practice of driving the exciters directly from the main shaft at 3,000 r.p.m., has been dropped by some manufacturers, it is, in fact, somewhat remarkable that with the difficulties of designing a d.c. machine for continuous service at this high speed, it should have persisted so long. A contest will probably now develop between the gear driven exciter from the main set, and the separate motor driven exciter as exemplified by the sets at Littlebrook and Stourport B.

Another point worthy of mention lies in the foundation block techniques adopted by the two firms. The Parsons' machine had their foundation blocks continuously poured, but those for Metropolitan-Vickers were constructed in ten lifts. The opportunity was taken in the latter of using the properties of reinforced concrete to the best advantage, with the result that the block looks rather more elegant and less solid than the former.

Closed air circuit cooling has been adopted for all four machines, the motors and fans being mounted on the foundation block.

Electrical System

The four alternators are rated at 50,000 kW, 0·8 p.f. and generate at 11·8 kV. Each alternator is solidly connected to a 58 MVA 11·8/132 kV generator transformer housed in a transformer annexe outside the station. Tappings from the 11·8 kV side of the alternators are taken to 11·8/3 kV 6 MVA station transformers for auxiliary supplies. The outputs from each of the four station transformers are taken to four unit switch boards, and from each of these boards, supplies are taken through 150 kVA unit transformers, 3 kV/415 V, to the unit auxiliary boards and the boiler house boards. Interconnectors join Nos. 1 and 2 unit boards to Station Board Red and Nos. 3 and 4 to Station Board Green. These two station boards, are also fed by two 7·5 MVA 132/3·3 kV transformers from the 132 kV busbars, so that auxiliary supplies can be made available to any unit from the grid system. The two station boards also supply, through transformers, power for the Boiler House Red and Green Boards, the Coal and Ash Plant Boards and the Pump House Boards.

All main switching is carried out at 132 kV in the outdoor substation, the switchgear being Reyrolle air-blast with a rupturing capacity of 2,500 MVA. In fact the great majority of switchgear is air break, the 3,000 volt system using B.T.H. metal-clad air insulated gear rated at 150 MVA, and the 415 system using B.T.H. metal-clad, air-insulated equipment with a rupturing capacity of 15 MVA.

The generator transformers are connected to the substation switchgear through 132 kV cables and from the substation, 132 kV lines go out to Bournemouth 1 and 2 and to Salisbury and Dorchester.

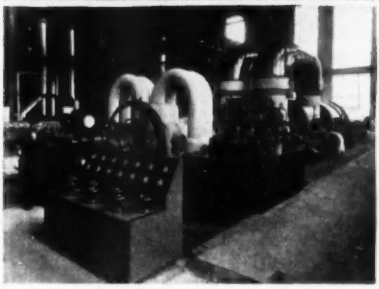
In order to avoid noise and vibration, the control room is located in a separate building alongside the substation. This has a semi-circular control board, and is lit by top windows or by fluorescent ceiling lights.

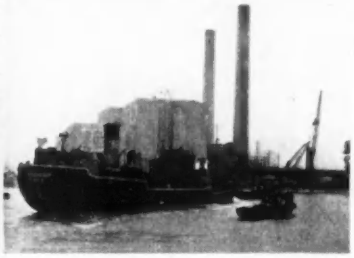
Circulating Water Plant

To obviate the possibility of recirculation the circulating water is taken from the Holes Bay channel, near the coaling wharf, and discharged into Wareham Channel. The pump house was constructed inside a cofferdam and has a concrete floor 6 to 10 ft thick. The outer wall which has to stand the pressure of the mud is 9ft thick. Eight 3 ft 6 in. by 9 ft penstocks and four 46 in. dia. suction pipes were built in the wall. The four circulating water pumps of the horizontal centrifugal type made by Drysdales are powered by 525 h.p. B.T.H. motors, and each is capable of delivering 35,000 gallons per minute. The water is pumped from the pump house to the turbine house through two 6 ft dia. tunnels formed of cast iron segments and lined with 2 in. of "Gunite". A "bus" system is used so that the pumps may be interchanged, and at the power station the two inlet tunnels run into bus mains, each of which feed two sets. These again can be connected together if necessary. From the outlet side of the condensers, the cooling water is discharged into two similar tunnels which run into a junction chamber located just outside the station building at the West end. From this junction point an 8 ft dia. tunnel 1,700 ft long leads to the outfall.

The pipes inside the turbine house were made of 76in. dia. steel as cast iron was in short supply,

The pictures immediately below show Permutit water treatment plant, and the M.V. set (No. 1) on load





Above is a view of the 132 kV substation and on the left one of the colliers is shown at the coal wharf

Ash Disposal

The "Hydro-jet" system of ash disposal is employed for removing ashes from the boiler furnaces, the slurry being conveyed to an ash sump on the North side of the station. The clinkers are crushed to make the ash/water mixture easier to handle and it is then pumped into bunkers.

To avoid dust and grit emission from the chimneys, electrostatic dust precipitators have been installed, one twin set being used for each boiler unit. The dust extracted by these precipitators is removed by a "Hydro-Vac" vacuum system and conveyed to the ash bunkers.

Ash disposal is always a problem and in this case it was originally proposed to dump the ashes in the sea, using barges for the purposes. However, due to various circumstances this scheme has temporarily been dropped, and the ash is being removed by a fleet of 9-ton lorries which are dumping it at a tipping area at Turling Moor where some 80 acres of saltings have been made available for disposal purposes. When the level of the saltings has been raised by about 9 ft the area will be topped with soil and the reclaimed site returned to Poole Corporation for their use.

Feed Water Plant

Make-up water is taken from the town's mains and is unfortunately extremely hard. For this reason, two separate treatment plants have been installed. The first of these comprises a Permutit spiractor and base exchange plant followed by evaporators. The capacity of each evaporator is 25,000 lb of treated water per hour.

The second treatment system which is at the moment to a certain extent experimental, is a Permutit de-mineralising plant. This comprises three ion-exchange stages in the first of which all salts present in the raw water are converted to their acids; in the second the acids are removed—with the exception of CO_2 in solution; in the third, the silica content is removed, and finally the carbon dioxide is removed by a degassifier. After deaeration the water is suitable for direct injection into the boilers. At the moment a certain amount of difficulty is being experienced with ammonia, but it is expected that this will be cleared shortly.

The water feed pumps are located at turbine floor level between the turbo alternators and the boilers. At the moment five electrically driven units are installed each capable of delivering 525,000 lb/hr. Two steam-driven units are to be included, each capable of handling 545,000 lb/hr. The feed heaters—one l.p. and four h.p.—are mounted in the

basement. Final temperature of the feed water is 340° F.

Also in the basement are the air ejectors and the extraction pumps.

Present Progress

At the time we visited the station (May 16) erection was in a fairly advanced state. Nos. 1 and 2 boilers were both under steam, while Nos. 3 and 4 were well advanced. No. 1 turbo-alternator (M-V) was running under load and had been running for some time. No. 2 (M-V) machine had the turbine erected, and the alternator was in process of being erected. No. 3 set (Parsons) had also been erected and was turning over on the barring gear with domestic steam passing for drying out purposes. No. 4 set, however, was at a very early stage. Although Nos. 1 and 2 boilers were under steam, much of the automatic and recording equipment had yet to be installed.

Most of the civil engineering and handling gear had been completed although the coal transporter system was not yet in operation, coal being fed from the coal store by a mobile grab crane.

The canteen and amenities building was being roofed and generally the building work appeared to be in an advanced stage.

It should not therefore be long before the first three sets are on load. Incidentally, although the existing plant is designed for four sets and eight boilers, the station is capable of being extended to accommodate two further sets and four further boilers.

Our thanks are due to Mr. R. H. Coates, Divisional Controller (Southern Division), Mr. C. W. A. Priest, Generation Engineer (Construction), and Mr. L. E. Brickwell, Superintendent of Poole Power Station, for the information given in the above article.

PRINCIPAL CONTRACTORS

Consulting Engineers	Merz and McLellan.
Civil Eng. Consultants	Mott, Hay and Anderson.
Consulting Architects	J.L. Couves and Partners.
Building and Civil Engineering	Sir Robert McAlpine and Sons.
Turbo Alternators	C. A. Parsons and Co.; Metropolitan-Vickers, Ltd.
32 kV Switchgear	A. Reyrolle and Co., Ltd.
3 kV and 415 V Switchgear	British Thomson-Houston Co., Ltd.
Boilers	International Combustion Ltd.
Economisers	Senior Economisers Ltd.
Superheaters	The Superheater Co., Ltd.
Tunnel Finishing	The Cementation Co., Ltd.
Chimneys	Tileman and Co., Ltd.
C.W. Pumps	Drysdale and Co., Ltd.
Evaporators	Hick Hargreaves and Co. Ltd.
Water Treatment	Permutit Ltd.
Coal Handling	Stothert and Pitt, Ltd.; Mitchell Engineering Ltd.; David Brown and Sons, Ltd.; International Combustion Ltd
Ash Handling Plant	Babcock and Wilcox, Ltd.
Steel Erection	Alex. Findlay and Co., Ltd.
Precipitators	Lodge-Cottrell, Ltd.
Feed Water Pumps	Mather and Platt, Ltd.
Soot Blowers	Ivor Power Speciality Co.
Generator Transformers	Fuller Electrical and Mfg. Co., Ltd.
Small Transformers	Hackbridge Electric Co., Ltd.
Pipework	Aiton and Co., Ltd.
Water Valves	Blakeborough and Co., Ltd.
Steam Valves	Dewrance Ltd.
Boiler Control	Bailey Meters and Controls, Ltd.
Screens	Brackett and Co., Ltd.
Cables	Pirelli General Ltd.

JOINT ENGINEERING CONFERENCE OPENS

STIMULATED by the Festival of Britain, the three Senior Engineering Institutions are holding a Joint Engineering Conference from June 4 to 15. At this Conference Papers are being read covering all sections of British Engineering development.

At the formal opening session, Dr. W. H. Glanville, introducing the principal speaker, the Rt. Hon. Richard Stokes, Lord Privy Seal, referred to the main aim of the Conference in reviewing the last one hundred years of engineering progress. He regretted that the Lord President of the Council, Viscount Addison, was unable to be present due to illness.

Mr. Richard Stokes stated that he had few qualifications for the task of opening the conference. He was, however, a Member of the Institution of Mechanical Engineers, and also responsible for activities in connection with the Festival Year.

In more serious vein, he referred to the importance of the chemical engineer in devising substitutes for materials in short supply. He thought that the world would be much better off if more engineers were engaged in the governments of various lands.

Politically, the engineer could contribute to the happiness of mankind and remove many of the social conditions in which Communism flourished.

A vote of thanks was proposed by Mr. A. C. Hartley, President of the Institution of Civil Engineers and seconded by Sir Archibald J. Gill, President of the Institution of Electrical Engineers.

Among the papers presented was one by Sir John Harking on "Generation, Transmission and Distribution of Electricity"; "The Development of Hydro Electric Power Schemes," by Sir William Halcrow, and "Power Station Design and Construction," by Mr. V. S. Bartlett. Today, Thursday, Mr. C. M. Cock will discourse on "Electric Traction and Signalling," and Mr. V. A. Pask on "Mechanical Plant for Power Stations."

Our readers' views . . .

Steel Shortages

USERS of conduit and steel conduit fittings must be as bewildered as we as manufacturers are, by the conflicting statements shown in the Press and over the radio, that steel production has been maintained at its record level and is likely to be increased, whilst our suppliers of steel have been compelled to reduce supplies by 20% and even 50%, with a consequent reduction in production, and supplies to the trade.

We feel that this matter should be clarified at a high level, in order to avoid mistrust, not only between employer and employee, but between manufacturer and user.

H. French
(Director)
F. C. BLACKWELL & CO., LTD.

LIVERPOOL

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Metric Measurement

IN your review of the report by the Board of Trade Committee on Weights and Measures you refer to a point that the decimalisation of the coinage must be included. You will be aware that various proposals have been made to achieve that object and that the Government of South Africa is reported to favour a scheme in which the unaltered Crown would be the principal coin of account. The following table of coins and accompanying comments may therefore be of special interest at this juncture:—

Denominations	*Crowns and cents*	*Equivalent* s.	d.
PAPER			
100 cents—crown	1·00	5	0
SILVER			
50 cents—halfcrown	50	2	6
20 cents—shilling	20	1	0
10 cents—sixpence	10		6
5 cents—threepence	05		3
BRONZE			
2 cents—decimal penny	·02		1·2
1 cent—decimal halfpenny	·01		·6

New notes could be issued, as required, in crowns and in its usual multiples at the unaltered rate of 4 crowns to the pound. All the silver coins could be described in cents without change of value. The existing bronze coins could be used as cents representing twenty per cent higher values than pence, and exchangeable at the equality rate of 5 cents for threepence.

Harry Allcock

ALTRINCHAM

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Bedding Brushes

YOUR contributor "F.S." in his article "Saving Maintenance Time" is justified in his observations concerning the difficulties of brush bedding. May I remind him that all reputable brush manufacturers will supply brushes with radius to suit the commutator or slip-ring. If, on the other hand, he has to resort to bedding it would be better to employ the bedding stones recommended by the manufacturers. These are prepared in a variety of grades and sizes and since they can be supplied by the brush manufacturers one may rest assured that the material chosen is the one which will have the least adverse effect on the brush both chemically and with regard to its current collecting properties. In any event the use of an abrasive containing silicon carbide is to be deprecated.

After the application of the bedding stone it is as well to treat the surface of the commutator with a "Glass Brush."

John M. Harding
Assoc. I.E.E.
SYNTHETIC CARBON AND ENGINEERING CO., LTD.

MUSWELL HILL

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Variable Speed Drive

THE article "Rectifier Controlled Variable-speed Drives" by J. C. Milne which appears in the current issue, is likely to prove misleading. I should like to make a point by point comment, but as this would take up as much room as the article itself, I shall be more general. In various places the article reads, in turn, "practical examples given"—"question of inductance capacitance and angle of overlap have been

neglected"—"examples are mainly of academic interest," and I venture to suggest that in view of the uncertainty which these self-contradicting phrases cause, the author should clarify his remarks.

Mr. Milne has compared the free-firing, and the grid-controlled rectifiers (both unsmoothed) and has reached false conclusions simply because the former does not need so much smoothing as the latter. If I may make a mechanical analogy, Mr. Milne has taken the flywheel from an internal combustion engine in order to compare with a turbine, has found it to be not so smooth running, and then gone on to conclude that the internal combustion engine should not be used to propel automobiles.

The only fair conclusion reached is that the free-firing rectifier has a better power factor than a grid-controlled rectifier working with a finite amount of anode firing delay. On the other hand no mention is made of the disadvantages of induction regulator control which briefly are (1) slowness of control response (2) additional mechanical maintenance due to non-static machine; (3) the fact that inversion braking is not possible as it is with a grid-controlled set.

The author's remark to the effect that with a grid-controlled rectifier the control is "purely by electronic methods" is also incorrect, as magnetic phase shifting networks can be, and are, used.

I can only hope that actual users of grid-controlled variable speed drives will not be disturbed by this article, and I would hasten to assure prospective users that there is no more likelihood of them being supplied with an unsmoothed grid-controlled rectifier than there is of their finding that the flywheel has been omitted from their new car—when they get it.

R. Wells

WALTON-ON-THAMES A.M.I.E.E.

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HAVING just read the article on "Rectifier Controlled Variable-Speed Drives" published in your issue for May 24, I feel bound to write and point out that the author has fallen into the age-old trap, and treated the grid-controlled rectifier exactly as a free-firing rectifier, with the usual disastrous results.

The output voltage of a free-firing rectifier is not affected by variations in load circuit inductance, and the voltage regulation can be predetermined from a consideration of the characteristics of the supply, the transformer, and the bulb. Increased voltage drop can be obtained by the addition of anode inductance which will give a drop approximately equal to $Id.X\frac{\pi}{2p}$ where Id is the direct current, X the anode circuit reactance and p the number of rectifier phases.

In considering the grid-controlled rectifier, the above conditions only hold good while the output current remains continuous. Once it is allowed to become discontinuous, the pulses of direct current will not differentiate between anode inductance and cathode inductance (such as may be due to the presence of the motor, or any smoothing inductance which may be added in the circuit). The voltage regulation of the equipment is thus increased enormously, and the motor speed-torque curves will be such as to render the equipment quite useless for most applications, as the author shows.

If, however, additional inductance is added to the armature circuit the anodes will not extinguish as shown in Figs. 3 and 4 of the article but will be forced to continue firing until all the energy stored in the circuit inductance is given up, even although they become negative with respect to the neutral point of the secondary winding. With sufficient additional inductance, the anodes do not extinguish until another is ready to fire and current continuity obtains. The speed-torque characteristics of the set are now satisfactory although the output voltage of the rectifier is reduced by grid-control.

The above remarks are necessarily brief, and I will not pretend to have done justice to the subject here. I trust, however, that I have shown that the effects which we are asked to treat as "comparatively minor" are of outstanding importance.

Finally, I would point out the additional regulation that is caused by the addition of the induction regulator, the increase in size, weight and cost of the equipment and the speed of operation, which brings us to the point that all controllers are not necessarily electronic. Grid-control lends itself to systems employing peaking transformers, and automatic controllers which do not possess valves are becoming increasingly popular. I would say, therefore, that everything depends upon the application as to whether the grid-controlled rectifier, or the induction regulator, or for that matter the moving coil or the sliding contact types of regulator should be employed.

P. Bingley

SURREY GRADUATE, I.E.E.

E.C.A. HARROGATE

Record Attendance at Jubilee Conference

DEVELOPMENT of commercial practice and administration had been disappointingly slow compared with progress in electrical technique and applications, said the president, MR. P. G. WALLIS, ASSOCIATE I.E.E., in his opening address at the annual conference of the Electrical Contractors Association, which opened at Harrogate on Monday of last week.

Reminding his audience of nearly 800 delegates and guests that this, their Golden Jubilee year, coincided with the silver jubilee of their first conference, the president pointed out that the early aims of the association were as valid now as ever they were, and it seemed a fitting occasion to examine how far they had been achieved. If sober thought were given to the present position of electricity supply, it seemed doubtful whether the term "progress" could accurately be applied, and whether the country had really made the most of the last six years.

The year had seen two important events in the field of labour relations, the introduction of the E.C.A. Apprenticeship scheme, which was to be the subject of a paper later in the proceedings, and the establishment of Area Joint Industrial Councils to bridge the gap between the National J.I.C., and the District J.I.C.s, which had existed in certain parts of the country. The year had been a particularly difficult one from the point of view of strikes, and the contracting industry seemed to have a fair share of those who considered it their mission in life to create industrial unrest, and to flout the agreements between the N.F.E.A. and the E.T.U. and he urged both bodies to realise their mutual responsibilities towards the public and to work for a policy of *what*, rather than *who*, was right.

A new departure was the E.C.A.'s policy of accepting, when required, financial responsibility for the performance by its members of contracts into which they had entered, this being an extension of the policy in force for some years of giving an unqualified guarantee of the work carried out.

Although the Fair Trading Council had continued to perform the functions for which it had been set up, progress had been unavoidably slow. It was obvious, however, that a body representing so many diverse interests could only hope to make progress at all if goodwill was available on all sides.

Summarising the Association's aims in the field of electrical trading, the president pointed out that trade discount should be an equitable assessment of the value of the service given by the contractor and retailer in distributing the manufacturers' products, and should be reserved strictly for that purpose. An equitable schedule of quantity discounts should be established based solely on large quantity buying and this should be available to all classes of buyers. The industry, he felt was not grasping the present opportunity of setting up a stabilised structure which would withstand the critical efforts of Government bodies, and others who considered the protection of the public their own particular province.

On the question of purchase tax, he felt that the electrical industry had been singled out for special attack by the latest imposition. Nowadays equity and logic seemed to be left out of financial and economic considerations.

(Above) At the opening session. Left to right: T. E. Alger, S. Dickinson, Stanley N. Watkins, the President, L. C. Penwill, W. T. Trace, A. F. Plummer, H. Sadler. On right: Some of the delegates listening to the presidential address

During the year an organising committee had made sustained efforts to recommend the establishment of a National Inspection Council, on the basis of full participation by the B.E.A., by Area Boards, and the contracting industry as a whole. This would entail the establishment of a voluntary register on a more extensive scale than anything previously existing, and while this might be regarded as a delay to the Association's objective of compulsory registration, it might equally be regarded as a direct approach to compulsory registration in the not-too-distant future. It was a peculiar coincidence that the Ministry of Works should have established an *ad hoc* committee with the same object at the same time.

Relationships with the B.E.A. and Area Boards had remained cordial, said the President, and he was anxious to testify to the excellent spirit of co-operation which had prevailed, and to the help which had been extended to their committees. It would, however, be useless to pretend that all their troubles were settled, and it was still felt that there was unfair competition in the field of hire purchase trading; also that the Area Board accounts on contracting work did not yet reflect the true commercial considerations incorporated in the Summary of Agreed Principles. Area Boards and the contracting industry were partners in a great venture of public service and a highly developed sense of co-operative effort was essential.

Reviewing briefly some of the activities of the E.C.A. during the year, the President pointed out that the membership now exceeded 3,000, although he regretted that there had been some cancellations due to unwillingness to conform to certain industrial agreements between the N.F.E.A. and the E.T.U.

The decision of the E.C.A. to commemorate its golden jubilee in a fitting manner was given in an announcement regarding the founding of a chalet at the E.I.B.A.'s Broome Park home in the name of all its members.

Safety Lighting

First paper presented to the meeting following the Presidential Address was "Storage Battery Emergency Lighting Systems," by MR. E. R. SANDERSON, A.M.I.C.E., A.M.I.E.E., of Chloride Batteries Ltd., who introduced his subject by a consideration of the circumstances in which emergency lighting was required. While in certain cases it was necessitated by regulations, there were many cases where it was a virtual necessity, and its value as an amenity was becoming increasingly recognised. In addition to hospitals, many public buildings, blocks of flats, hotels, factories, and schools provided examples where emergency lighting was a necessity to an extent decided by many factors—humanitarian, moral and financial.

Basic systems of lead-acid storage battery emergency lighting were then described. While it was perfectly possible to utilise a battery discharging while the building was in use, and charged at other times, the system was seldom used, the initial cost of the large battery and its relatively limited life being two adverse factors, and it was more usual to utilise either trickle-charging or floating battery systems, the latter being suitable only when the secondary lighting was regularly used as part of the normal illumination, while the trickle-charge system could be applied whether this was the case or whether it was required only upon occasions of mains failure. It was emphasised that the life of a suitable battery (i.e. with heavy Planté positive plates) could be assumed as 20 years or more.

The remainder of the paper was devoted to technical details and relative advantages of various methods, including fully automatic systems and their application, with information on battery stowage and maintenance.

Apprenticeship

Second paper of the session was given by MR. W. T. TRACE (vice-president) on "The National Apprenticeship Scheme."

It has long been realised in the industry that youths employed fall roughly into three categories: (1) indentured apprentices; (2) those employed on a verbal understanding that they will normally be afforded the same training and facilities as an indentured apprentice; (3) those employed as casual labour. The industry's desire to discourage the last form of engagement, long recognised, was evinced in the 1943 agreement which introduced higher scales of pay for category 3.

The E.C.A. apprenticeship scheme, which came into operation on September 1, 1950, was the result of negotiations lasting nearly six years, it being evident that the two main parties—the N.F.E.A. and E.T.U.—were approaching the scheme from widely different points of view, the employers having as their objective the production of well-trained and efficient craftsmen, and the Union being more concerned with securing additional benefits for the apprentice, and the author pointed out that the scheme as finally agreed can only be regarded, at best, as a compromise.

(Above) Mrs. Gazard, Dame Caroline Haslett, T. E. Alger, W. A. Gazard and H. F. Truman

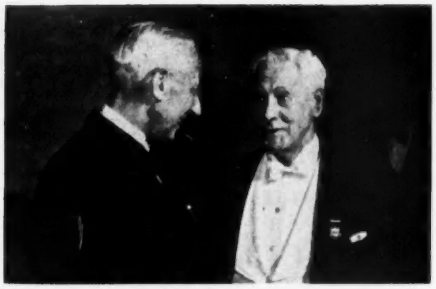
(Above) Mr. and Mrs. W. J. B. Soper being received by the President and Mrs. Wallis

Some of the guests enjoying themselves at the presidential reception. On the left is a group from the Preston and Fylde district, with A. Mc V. Ellis the District Chairman. The group on the right is from the West Country (Cornwall and Somerset) and includes W. F. R. Murt, E. R. Gardiner, S. V. Wise and J. F. Hurford

Under the scheme, which provides for both category 1 and 2 boys, a probationary period is served after which applications for registration are considered by both the N.F.E.A. and E.T.U., consent being given if both sides are satisfied that the employer has the requisite facilities for giving proper training, and the apprentice is capable of benefiting therefrom. Wages and conditions of employment are laid down, a most important clause being the necessity of attending technical courses up to the age of 18 where facilities are available, the employer being required to allow paid time off (in accordance with a schedule) and to defray the fees for such education. No new category 3 boys may enter the industry after the end of 1951, and some employers may, therefore, be faced with a necessity to reorganise.

In discussing the effect of the scheme on the industry, Mr. Trace emphasised that the Association should not allow the scheme to become a means of limiting the number of operatives in the industry other than by normal "dilution" rules, when it is borne in mind that quite apart from its own expansion, it trains journeyman electricians who find their way into practically every other industry in the country.

On the subject of apprentices themselves and their training, the author pointed out that if the scheme was to be really successful it was essential to have full co-operation from the E.T.U. and the journeyman electrician. This co-operation would only be forthcoming if the contractor showed by his interest in the scheme



An informal shot of Lord Citrine chatting with H. Dawson Roberts (C.M.A.)

that he was prepared to play his part in the proper training of apprentices. Not all firms could give the same wide practical training; there were many smaller firms, for example, whose activities embraced domestic and commercial work, without impinging upon the industrial field. Nevertheless, good electricians were required for this field as well as for others, and it was to the smaller firm that the scheme was primarily directed.

The Trading Structure

The last speaker, MR. L. C. PENWILL, Companion I.E.E., made it clear that his paper "Some Aspects of the Trading Structure of the Electrical Industry", was not intended to reflect the views of N.E.C.T.A., but was primarily intended to promote discussion.

Briefly reviewing the historical events which led up to the establishment of the Fair Trading Council, and the objectives of that body, Mr. Penwill emphasised that any attempt to secure for one section of the industry at the expense of another—or at the expense of the community—was no solution, and would merely perpetuate chaos rather than eliminate it. N.E.C.T.A. had always advocated limiting of trade discounts to reasonable proportions, with the object of ensuring a fair price to the public, but this policy was based on trade discounts being reserved for the trade—in other words, for those who performed some service to the industry and the community in return. The problem of ever-rising overhead charges faced by the contractor and retailer could be faced in one of two ways, either by increased discounts or by limitation of the number of retail outlets. In his opinion increased discounts were undesirable, since they led to price cutting.

Another principle which N.E.C.T.A. had always supported was that of quantity discounts, as long as they were based on proper commercial considerations. Large buyers were entitled to discounts according to their volume of trade, but it was time that the "recognised user" ceased to exist. There was, however, scope for the resuscitation of "standard package" discounts.

The reception committee. Left to right: The President, Mrs. Wallis, Miss Peggy Wallis, and the Mayor and Mayoress of Harrogate

The five-day week had freed many operatives to carry out spare-time trading and contracting, and these were encouraged by the facility with which they obtained supplies at wholesale prices, and he felt that it was high time that wholesalers put a stop to this. On the general question of wholesaling, he felt that the time had come when the wholesaler must make up his mind whether he existed to supply the trade or whether he would continue to supply the user direct, thus competing with his own customers.

Wholesaler's discounts, he felt, should not be a fixed percentage of the trade price of an article, and he would favour instead a substantial reduction in this "preferential," replacing it by a schedule of quantity discounts based on quantities purchased at one time. These quantity discounts would also be available to the contractor or retailer, and this would solve the vexed question of the B.E.A. and Area Boards, provided that no one but a

The President, Mr. Sadler and Mr. Penwill in relaxed mood

SOME OF THE THINGS THEY SAID

". . . It is a great satisfaction to me that these objects which many years ago seemed unattainable have, because of the persistence and efforts of your Association, been brought nearer realisation. . . ."—LORD CITRINE.

". . . We in the Electrical Contracting Industry seem to have a fair share of those people who consider it to be their mission in life to create industrial unrest and to flout the machinery for dealing with disputes, machinery which is the joint result of agreements between the National Federated Electrical Association and the Electrical Trades Union. . . . I urge both the N.F.E.A. and the E.T.U. to realise their mutual responsibilities towards ensuring an adequate electrical service to the public at economic rates. In the deliberations of the National Joint Industrial Council I hope for the establishment of a permanent policy of 'what is right' rather than 'who is right.'"—THE PRESIDENT.

"I can only say that N.E.C.T.A. is continuing, and will continue, by negotiation with, and pressure directed towards the manufacturer, to make every effort to ensure that—quantity for quantity—the private trader receives the same terms as his State-aided competitor. That must be one of the prime objects of the Association until we secure a greater measure of satisfaction from manufacturers than we have today."—MR. PENWILL.

"The Fair Trading Council is not a body of theorists and economists—the men serving are those elected by industry itself to study the problems in the light of all considerations. . . . The Policy merely publicises what the industry has already decided, and therefore it can be fairly stated to be the voice of the industry itself. It has been said by someone on the contracting side that there was no greater anomaly than the Fair Trading policy —unless it be a safety razor or a level crossing. . . . It would be remarkable if there were no anomalies. . . . Rome was not built in a five-day week."—MR. A. S. LOWE.

genuine registered wholesaler should get the basic wholesaler's discount. The position would be different, of course, in the case of a wholesaler (or group) acting as sole distributors of a manufacturer's products.

A reduced discount on installation material was suggested in return for the complete elimination of recognised user and large buyer classes. This would possibly result in the "material" content of a contract, after bearing a percentage increase for overheads and profit to appear higher than list price, so encouraging customers to buy materials direct at list price and thus tending to reduce the contractor to the status of a labour ganger. On this basis, the contractor, being bereft of the "material" contribution, would have to meet his entire overheads on his labour charges which would materially increase the percentage to be added.

The retailer was, of course, a different proposition. Here he had no labour costs on which to meet his ever-increasing expenses. Higher discounts brought with them the dangers of price-cutting and the growth of "meddlers" who did not attempt to give any technical service and were, therefore, content with a lower discount. The alternative, he was absolutely convinced, was a complete alteration of the trading structure to safeguard the genuine retailer as an effective link in the distribution of electrical merchandise.

DISCUSSION

MR. A. S. LOWE (Fair Trading Council) said it was impossible to over-emphasise Mr. Penwill's remarks that the Fair Trading Policy was not Utopia, but represented no more than the greatest measure of common agreement it had been possible to secure. The Council was not composed of theorists, but of men elected by the industry itself, and to study the problem from all angles, and it would be remarkable if there were no anomalies. Nothing aroused the contractor's ire so much as user discounts, but only those who had been in the industry long enough to have deep background knowledge understood why user discounts were allocated. The problem was still being energetically pursued by the F.T.C. and, given goodwill and co-operation, he was quite sure that there would still be a happy issue out of their afflictions.

MR. W. J. BIRD (G.E.C.) said that if a list of specially large buyers were compiled it would be a surprisingly small one. They heard a lot about unauthorised discounts being granted, but in his opinion it was not malicious intent but, primarily, lack of organisation—there was no real difficulty in controlling "spare-time" trading. He differed from Mr. Penwill's suggestion that the wholesaler's reward should be based on individual purchases, and favoured instead an annual rebate on the total quantity purchased. Registers of those entitled to user discount would help very considerably.

MR. A. J. STILING said that the altered trading structure meant a gain for the manufacturer—possibly for the public—but the contractor would pay for both. He produced figures to show the considerable difference in the percentages which would have to be added to labour costs if reduced discounts—which he for one did not want—prevented material from carrying its share of the burden.

MR. R. CUSSINS said that he was primarily a retailer—a neglected but necessary section. At the present time the doubling of P.T. on many items had changed the entire retail picture. Retailers' premises were the shop window to the world. They were up against a Socialist colossus, and if contractors did not counter the ever-increasing service centres by their own windows to the world, they would disappear like the old-time gasfitter.

MR. V. J. STOCK said that the contractor was first a designer and secondly a merchant—he did not want to bother with "labour only" jobs. Regarding discounts, there was no scope for reducing them. A recent order for £530 for apparatus and domestic equipment had given a gross return of £40—7% to earn which he had to pay the bank 4%.

MR. R. J. GRIFFIN said that he did not think N.E.C.T.A. was sufficiently interested in the retailer, and did not appreciate their problems in relation to purchase tax. To maintain their stocks, retailers would need 10% more capital.

MR. S. L. M. BARLOW referred to the shoddy material sold by unqualified retailers, and supported Mr. Penwill's plea for manufacturers to sell through qualified dealers. Many improvements in equipment had come about as a result of suggestions and comments from qualified contractors.

The Final Session

Final session of the Conference took place on Wednesday, after the annual general meeting, when the new President, MR. STANLEY N. WATKINS, was introduced.

In his introductory address, Mr. Watkins, after thanking Mr. Wallis for his remarks, said that he was justly proud of the Association whose foundations were laid 50 years ago, and was about to commence its second half-century. No one section of the industry could have everything its own way. Might was not necessarily right—and all sections of the industry were interdependent, and he hoped that all sections would make an honest endeavour to work in the fullest co-operation and trust.

The retiring President then returned thanks to the Mayor and Corporation of Harrogate, to MR. W. HARTLEY, the chairman of the stewards committee, to the authors of the papers, and to MR. E. BUTTNER, President of the N.E.C.A. (U.S.A.).

LORD CITRINE expressed his appreciation for the opportunity of being present at the conference, and referred to the President's thought-provoking address which he felt was very fair-minded. In congratulating the authors of the papers, he referred to their constructive attitude, aimed straight at vital questions.

In his own earliest days in the industry, security of employment was unknown, as were paid holidays. The industry had passed through many periods of difficulty and unemployment—it was sometimes well to remember these times and retain one's perspective.

As tangible evidence of progress, he pointed out that the influence of the electrical industry in the national economy had increased enormously. Electricity was no longer an amenity—it was part of the national life of the country. Domestic consumption of electricity was now 23 times that of 1926 and was ever-increasing. There was plenty of work in the years to come for both manufacturer and contractor—despite the pessimism of the economist, there were no signs of diminution. In the B.E.A. they were thinking not of 20,000 MW now but of 35,000 MW in 20 years time. The B.E.A. and others would, through the National Inspection Council, give full help to ensure that no consumer need fear the machinations of the shoddy contractor.

MR. E. BUTTNER brought greetings and congratulations from the National Electrical Contractors Association of America, and mentioned the parallel objectives and problems of E.C.A. and N.E.C.A.

The retiring President then referred to the silver jubilee of their Director and Secretary, MR. L. C. PENWILL, who had served 25 years in that office. On behalf of the membership he presented him with a cheque in token of their appreciation of his services. Mr. Penwill, in reply, paid tribute to his predecessor, Mr. Tait, and other founders of the Association.

Problems and Practice

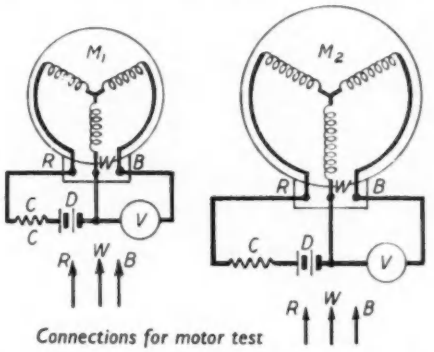
IN ENGINEERING

Motor Rotation

THERE are occasions when it is very desirable, or even essential, to be able to predict the rotation of a motor. The end shield of a three-phase slip-ring motor was fractured recently owing to this being started in the wrong direction. The motor was coupled to a centrifugal pump, the wrong rotation caused the shaft to become unscrewed in the impeller so that the impeller was forced against the casing and thrust transmitted through the shaft caused the slip-ring end shield to be broken.

The following method may be adopted to ascertain which direction a motor will rotate when connected to given lines of the supply. A motor M_1 is required, of known rotation. We will assume that the new motor M_2 is required to run in the same direction as M_1. The cables which are to supply M_2 as well as M_1 are assumed to be marked R, W. and B in accordance with usual methods. Before disconnecting M_1 its terminals are marked R. W, B, to correspond with the supply cables to which they are connected.

The motor M_1 is then connected to a battery D, a resistance C, and a low reading voltmeter V as shown in the sketch. The value of the



Connections for motor test

resistance C may be such that the voltmeter reads about half the voltage of the battery. The rotor of M_1 is then turned in the direction in which it runs normally, which causes the reading of the voltmeter to increase or decrease; the direction of the voltmeter movement being noted. After marking the three leads of the test set to correspond with the markings on the terminals of M_1, i.e. R, W and B, the test set is then connected to the terminals of the new motor M_2.

The rotor of M_2 is now turned in the same direction as M_1. If this causes the voltmeter reading to increase (or decrease) as was the case with M_1, the terminals of M_2 are then marked R, W and B to correspond with the marking on the leads of the test set. On the other hand, if the given rotation on M_2 causes the voltmeter needle to move in the opposite direction to that in which it moved in the case of M_1, two of the test leads are changed over at the terminals of M_2. The given rotation of M_2 will then cause the voltmeter needle to move in the same direction as it did when connected to M_1. When the correct voltmeter movement has been obtained the terminals of M_2 are marked to correspond with the leads of the test set. We can then predict that if the terminals R, W and B are then connected to the supply lines R, W and B, the motor M_2 will then run in the same direction as M_1.—*J. L. W.*

Voltage Reduction in the Factory

THE maintenance staff is faced with many problems during periods of pressure reduction, as has been emphasised in the ELECTRICAL TIMES. In one factory, considerable trouble was experienced with lifts. The management co-operated well by imposing a strict limit on the loads to be carried at such times as the starting torque, naturally, was poor.

Unfortunately, the pulling power of the magnet coils on the brakes and controllers was considerably reduced. On more than one occasion the controller operated while the brake stayed on, and the motor was in danger of overheating. One machine appeared to have a weak reversing coil, so an apprentice was posted in the control room with instructions to push the "down" coil gently when it made abortive attempts to do its duty.

The control circuits were supplied with d.c. current from a transformer and metal rectifier. On examination it was discovered that several tappings had been brought out from the primary of the transformer. A test showed one of a suitable voltage for the reduced mains.

Finally, a small single-pole, two-way switch was fitted so that either tapping could be

selected. It became one electrician's duty to run round the control rooms when the voltmeter fell back, and switch over. This simple expedient has operated successfully through two difficult winters.

A similar procedure was adopted in the case of a master clock and set of slave dials fed by transformer and rectifier. Without dismantling the transformer sufficient turns were stripped off, tapped and replaced. By switching over at "low" times the annoying task of resetting the "slaves" was obviated, as with reduced current many of them would refuse to tick over.

It was found advisable also, to select the lowest reasonable tapping on the chokes of low-tension fluorescent lamps. The trouble here was the intermittent striking of thermal or glow switches. Instant start devices would have helped in the low-tension fittings, but this was ruled out as expensive. In new installations, however, they are likely to be favoured.—*W. H. A.*

Heavier Fuses for Starting

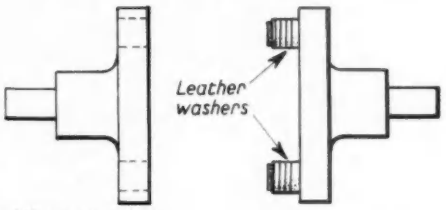
RECENTLY I received a complaint from from one of our machine shops that an intermittent electrical fault was causing considerable trouble on an American bolt forging machine. The nature of the trouble was as follows: this machine is fitted with micro-switches on the pick-up fingers so that any slight defect in placing a bolt in the dies causes one of the micro switches to reverse the contactor and plug the motor to a standstill. We found that when a micro-switch operated, the motor ran up to full speed in the reverse direction instead of being plugged. We also found that one of the h.r.c. fuses in the main switch was blown.

Trouble was suspected on the plugging switch and this was replaced with a spare, but the same thing occurred again next time the micro-switches were operated. The motor, contactor gear and machine wiring were all examined and proved trouble free. Eventually after much head-scratching the trouble was traced to the h.r.c. fuses. Although these were of sufficient size for normal direct-on-starting, the higher currents taken on plugging were blowing them. This was happening after the first reversal and the motor was then running up in the reverse direction as a single phase machine.

The plugging switch being operated itself by reversals of the motor did not operate after the first reversal and there was nothing to prevent the motor attaining full reverse speed. Heavier fuses (80 amp against 60 amp for this 15 h.p. motor) were fitted and no further trouble has been experienced.—*J. A. V.*

Weak Bedplate

A MOTOR generator set had been built up with a solid coupling, and mounted on a bed composed of two light 6 in. girders bolted together by means of 1 in. diameter transverse bolts, pulling on to spacers made from 2 in. steam piping with faced ends. The completed set had been mounted on the usual concrete bed, lined up, and grouted into position.



Alignment spigot faced off

For clarity only two coupling assemblies are shown

Speed and cheapness in construction had evidently been important considerations, but when the writer arrived on the scene after the set had been running for about three months, quite a lot of trouble was being experienced with the plain, ring oiled bearings overheating. Removing the coupling bolts, and prising the couplings apart sufficiently to clear a shallow alignment spigot, enabled alignment checks to be made with straight-edge and feelers.

These tests showed that the heavy generator had sunk out of line, so shims were placed under its feet to bring it into line. After this attention, the set ran for another three months or so, until further bearing trouble was reported. Another alignment check disclosed further vibration in alignment, not much, but enough to cause trouble with a solid coupling. As the plant supplied by the generator was due for a close down, the opportunity was taken to convert the solid coupling to a flexible one as sketched.

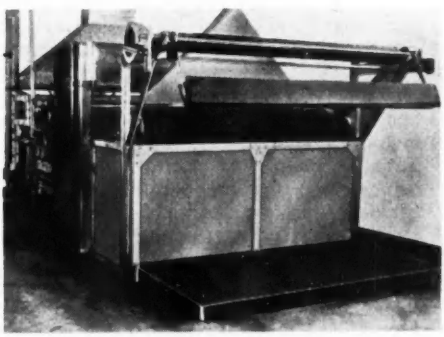
No further trouble was experienced with bearings overheating, but there is no doubt that the real fault lay with the comparatively flimsy bed, possibly aggravated by the incorrect placing of the lining-up shims before grouting. It would seem that a rigid cast-iron machined bed is, after all, the cheapest for heavy sets coupled by means of solid couplings.—*F. S.*

Cloth Pre-shrinking

New Emerson Machine uses Infra-Red Drying

DURING the manufacture of woollen and other fabrics almost every process tends to stretch the component fibres and yarns. Yarns are sized, woven and finished under tension, and the cumulative stretch is "set" in the fabric, and remains stable until the cloth is subjected to a more extreme combination of temperature and regain. Shrinkage, the subsequent relaxing of this stretching, is one of the most difficult problems faced by the garment manufacturer.

An effective answer to this important problem is now claimed to be provided by a new machine designed by Mr. W. S. Emerson, B.Sc. The machine employs Metrovick infra-red projectors which consist of tubular heating elements of fine grade wire, enclosed in an outer sheath of non-scaling, non-corrodible alloy, fitted in specially designed trough shaped reflectors. These reflectors are constructed from aluminium sheet which is anodised to prevent atmospheric corrosion and to ensure



maximum heat reflection. The machine, which can handle over 5,000 yards of cloth in a working day of eight hours, puts the fabric through three processes.

Process Sequence

In the first stage it is overfed at a calculated differential on to a steaming conveyor through a specially designed chamber which induces relaxation under absolutely uniform conditions.

The next stage—drying—is effected by the Metrovick infra-red element projector. This remarkably efficient method of drying, to which the machine largely owes its extremely high rate of operation, removes the correct percentage of moisture in the incredibly short time of 4 to 5 seconds, restores the material to its normal regain content, and ensures uniformity and evenness of drying over the entire area of the piece.

The material, after emerging from the infra-red unit, is then cold set by high velocity air impact. This cools, sets and stabilises the fabric which is delivered evenly and without tension by an automatic device.

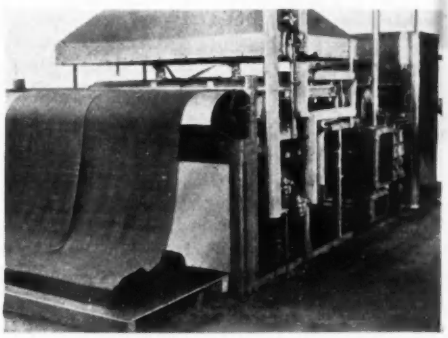
The material is now ready for making-up operations and requires no recuperative time whatsoever. The cloth is restored to its normal regain and possesses perfect finish with soft normal handle and unimpaired strength.

The machine is fitted with a variable speed gear of positive type which provides stepless variations of speed from 7 to 27 yards per minute. The average length of a piece treated is 70 yards; one such piece being generally arranged to pass through in 4-6 minutes.

This rate of 10-14 pieces or 700-1,000 yards per hour is an extremely high rate and is greater than anything hitherto considered possible for this class of machine. Floor space required in the shrinking room is reduced to a minimum.

Throughout the process the operation of the machine is completely automatic. This makes the machine extremely economical in labour requirements.

These photographs show, left, the delivery, and below, receiving ends of the machine. The infra-red projector drying unit can be seen in the casing near the delivery end of the plant.



Instrument Design

Outstanding Review of Development at I.E.E. Conference

THE electrical industry is probably more dependent on the accuracy of its instruments than any other. It certainly uses a far greater number of metering and measuring instruments than any other, and the importance of measurement was early recognised by the establishment of the Measurements Section of the I.E.E.

When he opened the Conference on Instrument Design, recently given at the I.E.E. under the auspices of the Instrument Section, Dr. W. G. Radley emphasised the fact that the progress of physical science had been the history of electrical measurements. The National Physical Laboratory had been of great value in the establishment of the absolute system of units, but it was no good having instruments of high value if the observer was liable to make mistakes. The most widely used method of presenting information to the observer was by the movement of a pointer over a scale, and the Department of Applied Psychology at Cambridge University showed definite principles which needed to be followed in the design of lettering, numerals, scale markings and the pointer.

No fundamentally new principles had been applied to the measurement of electrical quantities, but improved designs had led to a decrease in the variety of controllable defects. These, however, were still far too high.

New materials, particularly for the construction of magnets, had been developed; and new synthetic dielectrics were being increasingly used. Components had much improved in stability, precision and reliability.

A new requirement was for d.c. amplification in connection with photo-cells and thermo-couples, and magnetic amplifiers were the probable solution. Finally, there was a new requirement for quasi-optical measurement in the 1,000 Mc/s to 100,000 Mc/s band.

Opening Lecture

Dr. L. Hartshorn in his opening lecture on "Some Aspects of Electrical Instrument Design" began by giving some details of balances used by the N.P.L. to illustrate the fundamental requirements. He pointed out that in defining the ampere at the N.P.L. it was necessary to use a knife-edge balance, as no other instrument was capable of measuring force with the precision required. The existing limit of sensitivity—one part in 10^9—was not far beyond practical needs. He thought that the quartz fibre micro-balance was probably not yet fully exploited in electrical work of high precision.

An early suggestion by C. V. Drysdale in 1932 proposed that all electrical instruments should be filled with oil or some other liquid of high electrical strength and suitable viscosity. This had not eventuated, although high vacuum had been used both in connection with electrostatic instruments and h.v. condensers. Electrostatic techniques suffered from leakages which were difficult to control, but the electrometer of Ramsey transformed a meter with impedances measured in millions of megohms into an ordinary voltmeter.

Reading the Instrument

However accurate an instrument may be, the final observation is generally made by the human eye, and care must be taken to ensure that the requirements of the observer are met. These may vary considerably. In the laboratory accuracy of reading is of primary importance; in the power station the degree of accuracy may be less, but speed of reading may be paramount. Where long series of readings are required, fatigue and tiredness must be avoided as far as possible. Most of these requirements can be met in greater or lesser degree by the correct design of scales, numbers, pointers and by the form of presentation. Considerable work has been carried out to ascertain design principles by the Applied Psychology Research Unit of the Medical Research Council at Cambridge University. These findings, together with a proposed specification for instruments, were comprehensively dealt with by Mr. L. B. S. Golds[2]. During the Cambridge researches, N. H. Mackworth found that figures constructed of straight lines and sharp angles were read more quickly and accurately than figures constructed from curves. He also found that the height/width ratio of the letter or figure should be approximately 1 : 1; the space between letters or figures half the average width; the width of the lines 12% of the general height; and the stroke width 7·7% if the letters are white on black or 12·5% if black on white.

For good legibility the height should subtend an angle of about 18 min at the eye, corresponding to a height of 1·7 cm at 10 ft distance or 2·5 mm at 18 in.

A revision of B.S. 89 was suggested by Mr. Golds, and as a basis he prepared a guide to the preparation of a performance specification covering laboratory instruments, industrial instruments and graphic instruments. This is well worthy of study by all interested in the subject.

New Principles

Despite the predominance of the more established forms of meter movement, modern developments have opened up fields in which special measurement equipment is required. One of the major difficulties in the past has been the measurement of small d.c. currents or the d.c. voltages associated with such currents. These are produced by thermo-couples, photocells or nuclear-particle counters. One method recently developed is by using magnetic amplifiers; another is by modulating the d.c. input and using thermionic valves. The latter, however, suffers from the defect common to most valve operated measuring equipment, which is the difficulty of obtaining valves with stable characteristics, or pairs of valves with matched characteristics.

Mr. D. C. Gall,[1] who dealt with these types of instruments gave a general picture of the present position, and outlined the major difficulties encountered. One of these was the obtaining of stabilised a.c. and d.c. power supplies for obtaining reference voltages for precision testing.

Among recent developments in the measuring field are calorimetric methods for measuring the power loss in ferro-magnetic materials at high frequency, and ultrasonic methods for deriving the speed of travel of waves in materials. By this means, knowing the density of the material, it is possible to derive Young's modulus, Paisson's ratio and volume elasticity.

In all measuring equipment, the economics of accuracy must be taken into account, and Mr. Gall gave some general remarks covering this point.

Accuracy and Performance

To the working engineer, the question of absolute standards is somewhat remote. He knows that the N.P.L. is responsible for ultimate standardisation and that his standard instruments need calibration against the N.P.L. standards, but he is scarcely interested in the derivation and accuracy of those absolute standards. For those people, however, who are interested, the paper by Mr. A. Felton[3] is of considerable importance. It is not, however, proposed to deal with the paper here. It was pointed out by the Author that the legal standards, maintained at the N.P.L. are less accurate than the laboratory instruments used in everyday routine measurement, although, of course, the absolute units possess a high degree of accuracy.

The question of performance is, of course, of more immediate importance to the engineer, and Dr. Arnold[4] was of the opinion that further substantial advances in the accuracy of the best instruments under favourable conditions were not to be expected.

Sensitivity is dependent in the first place on the length and shape of the scale, and can be increased by using magnifying glasses, etc. With a skilled observer, pointer movements of 0·001 in. can be detected, but the probable limit of sensitivity is about 0·002-0·003 in.

Accuracy of the best types of electrical instruments approaches the limit of sensitivity, which at full-scale deflection can be taken as 0·1% for portable and 0·01% for long scale laboratory deflecting instruments.

As Dr. Arnold is at the N.P.L. he has a considerable knowledge of the defects from which meters submitted for test (B.S.89: 1937) suffer, and, in the commercial field, out of ammeters tested in the years 1945-50, one in three was found to be defective. Voltmeters were better, five out of six instruments being satisfactory. Wattmeters, too, show considerable improvement, while the design and manufacture of instrument transformers is excellent.

Components for Instruments

The criteria for instrument components are stability, reliability and long life. Here a considerable difference occurs between electrical measuring instruments such as voltmeters, ammeters and wattmeters, and electronic instruments in which the final indicator is associated with possibly highly complex intermediate electronic circuits. In the paper by R. E. Hall and E. Coop [7], the latter type of instrument was considered, which materially includes such items as electrolytic condensers, carbon resistors, potentiometers, capacitors and other radio type components.

Statistics collated from the Atomic Energy Research Establishment, where a large number of such instruments are in use, showed that, excluding valves, resistors are high in the list of failures. In composition resistors, much trouble is due to values changing during soldering: with high-stability resistors (carbon type) most of the causes of failure are due to bad contact between

the resistive film and the end cap, or open-circuit of the spiralled track.

Experimental work is still going on to improve the quality of this type of resistor, although the work on using cathode spluttering techniques to produce a thin metallic film on a ceramic or glass rod or tube has so far produced disheartening results due to the instability of the film.

By firing gold or gold alloys on glass rods and spiralling, a stable resistor has been produced, but the wire-wound resistor is still the most stable type. The Authors also considered new capacitor developments using glass and plastic dielectrics, variable capacitors, valves, crystal units and transformers and chokes.

Magnetic Materials and Dielectrics

In instrument design, there is a requirement for properties of soft magnetic alloys which is not always fulfilled by the information generally given. This omission has to a large extent been rectified by Dr. G. A. V. Sowter[5], whose paper covered the properties of Mumetal, and to a lesser extent Radiometal, Silcor, Rhometal, Vicor, Supermalloy, and Permendur. Properties found with d.c., a.c. and combined a.c./d.c. operation are indicated, and recommendations as to the best alloy to employ in particular circumstances are made. Many curves are given which will be of interest to designers.

On the dielectric side, as Mr. C. G. Garton[6] points out, there are a hundred or more natural and synthetic materials which may meet various requirements in the insulation of all kinds of electrical instruments and it is impossible to describe all these at length within the bounds of an I.E.E. paper. However, he provides a fairly full list of sources of numerical data, and confines himself to a discussion of new materials and of the factors upon which the electrical properties of the material depend. The greater part of the materials considered were synthetic polymers. He divided the paper into sections, the first dealing with inorganic rigid materials, such as silica, glass, porcelain, steatite, capacitor ceramics, mica, Mycalex and marble; the second with rigid organic materials, of which there were few combining mechanical strength with good dielectric properties. In the synthetic field ebonite and polystyrene combine considerable rigidity with good electrical properties, the latter being the better.

Two new synthetic materials with higher working temperatures should be available when production in Britain is sufficiently increased. These are polytetrafluor-ethylene (p.t.f.e., Fluor or Teflon) and polychlor-trifluor-ethylene (p.c.t.f.e. or Kel-F). They have working temperatures of about 250° C and 175° C respectively. Neither of these substances is, however, completely rigid.

Several laminated or filled combinations of two materials have been made to combine strength and good rigidity, but care must be taken to avoid water absorption. Mr. C. G. Garton finishes with some notes on silicones, moisture protection, and Araldite adhesives.

New Instruments

The Conference concluded with three papers on new instruments. Of these, the first, by Dr. A. F. Harvey[8] described the equipment used in the microwave band for the measurement of power, frequency and impedance. The majority of instruments use waveguide system s although at the longer wavelengths coaxial, systems are used and in free-space semi-optical systems are utilised. Emphasis is laid on more recent instruments and also on those for the millimetre wavelength region.

The development of atomic energy and the uses being made of electro-magnetic radiations have led to the development of several instruments for detecting and measuring X-rays, γ-rays, α-particles, β-particles, protons, neutrons and mesons. A brief survey of the techniques used was given by Dr. D.Taylor and Mr. W. Abson[9].

Finally Dr. A. C. Menzies[10] gave a review of radiation measuring instruments used for the infra-red to the ultra-violet waveband.

AUTHORS AND TITLES OF PAPERS READ AT THE CONVENTION ON RADIO INSTRUMENT DESIGN, MAY 28-30

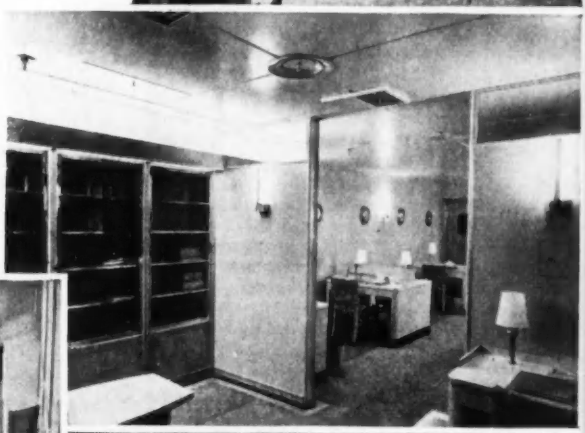
OPENING ADDRESS — W. G. Radley, C.B.E., Ph.D.(Eng.)
Lecture: "SOME ASPECTS OF ELECTRICAL INSTRUMENT DESIGN." — L. Hartshorn, D.Sc.
1 NEW PRINCIPLES IN ELECTRICAL MEASUREMENT — D. C. Gall
2 A SURVEY OF MODERN METHODS OF PRESENTATION OF INSTRUMENT READINGS AND RECORDINGS — L. B. S. Golds
3 THE ACCURACY OF MEASUREMENT OF ELECTRICAL STANDARDS — A. Felton, B.Sc.(Eng.)
4 PERFORMANCE LIMITS IN ELECTRICAL INSTRUMENTS — A. H. M. Arnold, D.Eng.
5 SOME SPECIAL CHARACTERISTICS OF SOFT MAGNETIC MATERIALS USED IN INSTRUMENT MANUFACTURE — G. A. V. Sowter, Ph.D., B.Sc.(Eng.)
6 THE PROPERTIES OF INSULATING MATERIALS USED IN INSTRUMENTS — C. G. Garton
7 COMPONENTS FOR INSTRUMENTS — R. E. Hall and E. Coop, M.Sc.Tech.
8 INSTRUMENTS FOR USE IN THE MICROWAVE BAND — A. F. Harvey, D.Phil., B.Sc.(Eng.)
9 RADIATION MEASURING INSTRUMENTS FOR THE INFRA-RED TO ULTRA-VIOLET WAVEBAND — A. C. Menzies, M.A., D.Sc.
10 RADIATION MEASURING INSTRUMENTS FOR X-RAYS TO COSMIC RAYS — Denis Taylor, M.Sc., Ph.D. and W. Abson, B.Sc.

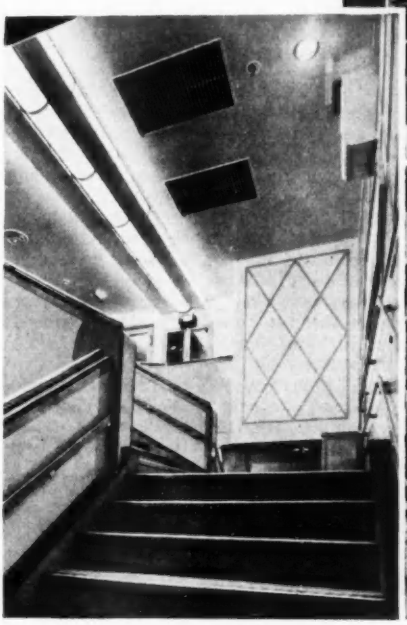
An Ambassador of Lighting

A SHIP to the seafarer is a living thing, a being with a personality and sometimes a temperament. Some ships are graceful and cause a surge of emotion in even the most disinterested landlubber. Others are the "ugly ducklings" as the hard-working tramps. Most certainly they are ambassadors of their country of origin, living examples of the design and engineering prowess of their country's craftsmen.

Such an ambassador is the new M.V. "Ruahine" built by John Brown & Co. for the New Zealand Shipping Co. to operate the passenger and refrigerated cargo run to Britain from the Dominion.

Once inboard, the voyager will be impressed by the tasteful furnishing and the efficient and attractive lighting installation. Here are some examples of the work designed by Easton & Robertson, F.R.I.B.A., and executed by the General Electric Co. Twenty-three different designs of fittings, both fluorescent and for tungsten lighting have been used. At the top of the page is seen a recessed corner of the lounge on "A" deck, below that is a view of the library and writing-room in which cold cathode tubes are fitted above the bookshelves with twin opal lamps behind peach opaque glass fitted as wall lights. Below is the stairway to "A" deck. The 25-ft. long 6-in. wide fitting, seen there, incorporates 178 ft. of gold and white cold cathode tubing and is probably the largest single fitting afloat. Below right, is a general view of the lounge on "A" deck





overseas news

Japan's Reorganisation

Despite a breakdown in the negotiations between the Public Utilities Commission and the Japan Electric Power Generation and Transmission Co. (see the ELECTRICAL TIMES, May 24), the Commission has now issued a formal directive for the reorganisation of the nation's power industry. According to the directive, Nippatsu and the nine power distribution firms have been dissolved and nine new power companies set up with effect from last month. The major points of difference of the latest directive from that tentatively issued some weeks ago include (*a*) the new power companies will have a maximum of 11 directors and 5 auditors instead of 27 directors and 5 auditors; and (*b*) the liquidation expenses of Nippatsu will be almost doubled. The latest directive, also drew further protests.

South Fremantle Starts

The 25,000 kW turbo-generator at the new South Fremantle power station, Western Australia, began supplying power into the Perth metropolitan system a few days ago. Revealing this, Mr. F. C. Edmondson, general manager and chief engineer of the State Electricity Commission of Western Australia, said that the contractors and their employees had overcome some major teething troubles and had worked continuously so that the plant would be ready to meet the winter load.

Another Adelaide Project

A new major power station to serve Adelaide and the surrounding area is likely to be constructed at Port Augusta by the Electricity Trust of South Australia. A final decision on the matter has yet to be made, but it seems that the Trust will approve the Government's plan for a second station at Port Augusta. The first station, now under construction, is expected to be operating in 1954. The second station will probably be twice the capacity of the first. The correlated transmission lines will probably operate at 220 kV. The State Premier, Mr. Playford, announced the Government's plan for the second power station last month, when he emphasised that it would be needed within seven years to cope with the State's expansion. The large guaranteed amount of coal now revealed at Leigh Creek and capable of open-cut mining had made it safe to recommend the construction of the second power station, he said. The two stations, which would be adjacent, would need about 20,000 tons of Leigh Creek coal a week.

Dollars for Packaged Sets

Confirmation that the Commonwealth Government had allocated $11 million for the purchase of "packaged" generating plant of 60,000 kW capacity for the State Electricity Commission of Victoria, was given by Mr. Dodgshun, Minister for Electrical Undertakings, last month. Of the plant, 30,000 kW is to be erected at Geelong, and 10,000 kW each at Ballarat, Mildura and Swan Hill. The first plant is to be operating by the end of 1952 and the others by 1953.

Melbourne's Results

With restrictions on the use of electricity and increased bulk supply costs, the City of Melbourne was forced to increase its tariffs last year, as the result of which gross revenue of the City of Melbourne Electric Supply Department increased by 11% to £1,434,495, the average price per unit sold being 1·608d., a rise of 8%. After making the usual appropriations, the net surplus is £31,124 in 1950 as against £39,919 in 1949, it is shown in the Department's annual report, just received. The change-over from d.c. to a.c. in consumers' premises continued at a cost of £29,600, the unrestricted d.c. demand being estimated at 8,000 kW, or 9% of the total estimated m.d. of the system. Units sold in the year ended September 30, 1950, amounted to just over 214 million, compared with 208·3 million in 1948/9.

E.C.A. of Canada

In modern building there is too great a tendency to spend more money on show or ornamental features than is put into essential services such as electrical wiring, Mr. E. W. McLeod, chief inspector for the Hydro-Electric Power Commission of Ontario, told delegates to the annual convention of the Electrical Contractors' Association of Ontario last month. He considered it would be a great thing if they could get away from cheese-paring on important things like wiring in favour of marble staircases. Urging more personal interest in the work of employees on behalf of electrical contractors, he stressed that in the final analysis it is the contractor's business which suffers if inferior work is done on his jobs. He felt that setting up of province-wide licensing standards would help improve the quality of work done. But if such legislation did come he hoped they would not use its powers for purposes not within the highest aims of the association. Another speaker stressed the need for a Province-wide licensing system for electricians. His views were supported by Gordon

Behling, president of the Association, who said the association had urged such a system to make certain that persons setting themselves up as qualified electricians were capable of doing the work properly. The licensing system was the only solution to haphazard work, since it would take an army of inspectors to go over every piece of electrical work done. Wiring was inadequate in at least 40 per cent. of Ontario public buildings, he said. Mr. Angus Fox, of Leamington, Ontario, was elected the new president of the Association.

Rural Work

Calgary Power Ltd., which operates in Alberta, plans to add about 3,000 new farm services this year to the 9,200 farms already supplied. Expansion of farm electrification will be possible by an extensive construction programme of primary and secondary lines.

Setbacks, yet Progress

Winnipeg is at present in the throes of an argument concerning the future set up for its electricity supply industry. It was only a year ago that the city hydro withstood a severe physical threat—that of flooding from the Red River. Further reference to this event, and to severe service interruptions caused by an exceptionaiiy violent windstorm four months later, is made in the 1950 annual report of the City of Winnipeg hydro-electric system, just arrived. On restoration work, the sum of $118,750 was expended. Yet the year's operations resulted in a net profit of $1,163,506; of this $1,040,000 has been contributed to the City of Winnipeg's general funds. Units sold increased from 707 million in 1949 to 734 million in 1950, the average annual consumption per domestic consumer rising by 4% to 6,672 units. Work on extending the Amy Street generating station is already well under way. A 15,000 kW set is being installed this year, and a 25,000 kW steam unit scheduled for installation by the end of 1953, will bring that station's capacity to 50,000 kW.

Another Calcutta Station?

The possibility of erecting a further generating station in India has been referred to by Mr. J. Donald, chairman of the Calcutta Electric Supply Corporation. He points out that with the approaching completion of the new Cossipore and extensions to the Mulajore station, the company's post-war plant programme will shortly end. But looking to the future, a site for a new station has been secured adjoining the existing Southern station, and plans and specifications have been prepared so that immediate action can be taken when necessary.

Supplying the Punjabs

At a recent meeting of the electrical engineers of the two Punjabs, held at Amritsar and Lahore, it was decided to extend the date of expiring of the arrangement to take power from the Mandi hydro electric project till the end of March 1952. West Punjab is reported to be making strenuous efforts to instal its own machinery for the generation of electricity, but self-sufficiency has not yet been reached.

N.Z. wants Plants

An indication that the New Zealand State Hydro-Electric Department was investigating a possible site for a coal-burning generating station was given to a deputation from the Electric Power Boards' and Supply Authorities' Association last month. Mr. Goosman made it clear that the investigation was not awaiting the completion of experiments with geothermal steam generation. The deputation, led by Mr. C. J. Lovegrove, waited on the Minister to discuss, among other things, the urgency of the need to establish plants to supplement the hydro-generating capacity of the Dominion. Reference was also made to the policy in Australia of importing and installing "packaged" steam generating plant, with the suggestion that such plant should be considered.

Rhodesia's New Line

A new 88 kV transmission line, 90 miles in length, built by the Electricity Supply Commission of Southern Rhodesia, was put into operation last month. The line runs from Gatooma to Salisbury, and links up with an existing line from Umniati River power station to Gatooma. The s.c. aluminium conductor, together with insulators and fittings, was obtained from Canada, and only the galvanised earth wires from the U.K.

Mines Link Up

Four mine power stations on the Rhodesian Copperbelt will soon be linked to one another and to a central switching station by a system of overhead h.t. cables. At present the only two mines connected in this way are the Roan Antelope and Mufulira—both owned by the Rhodesian Selection Trust. The mining companies have now formed the Northern Rhodesia Corporation which is to build a Copperbelt grid connecting all four mines and possibly taking in the town of Ndola as well. A central switching station is to be built near Nkana.

Victoria Falls Authority

Since the Victoria Falls hydro-electric power undertaking was bought by the Northern Rhodesia Government from the Victoria Falls and Transvaal Power Co. in 1949, its activities have been controlled by a non-statutory board. Legislation to be introduced this year will provide for the setting up of the Victoria Falls Electricity Board as a statutory body to administer the undertaking, the Northern Rhodesia Information Office has stated. The board will consist of a chairman and four others to be appointed by the Governor-in-Council.

PERSONALITIES

IN THE INDUSTRY

During his period as secretary of the British Electricity Authority since November, 1947, **Mr. H. F. Carpenter,** F.C.I.S., F.S.A.A., has extended his wide circle of friends, till he is now a nationally familiar and well-liked character; there will be genuine regret that he has decided to relinquish his appointment in the autumn on reaching superannuation age (60 in his case). He has discharged his responsibilities with outstanding ability, and the Authority hope to have the benefit of Mr. Carpenter's experience in another capacity. His association with the industry goes back to 1926, when he took up an appointment as clerk and treasurer of the-West Midlands J.E.A., which had only just been formed to take over and co-ordinate electricity generation in the West Midlands and the preparation of a distribution scheme to supply a large undeveloped area in Shropshire. In 1938 he was made principal officer of the Authority with the title of clerk and manager. Some time earlier, he held an appointment with the Metropolitan Water Board for 18 years, except for four years' war service. Mr. Carpenter was Chairman of the Council of E.D.A. in 1947. He was a member of the Conference of Joint Electricity Authorities and Joint Boards from its inception, and of the Conjoint Conference of Public Utility Associations. In 1949 he became the official representative of the B.E.A. on the Council of the B.E.A.I.R.A. He has also served on numerous committees.

Mr. H. F. Carpenter

Mr. H. J. Fortune, B.SC. (chem.), A.R.I.C., station chemist, Taylors Lane (Willesden) generating station, London Division, has been appointed to the Eastern Division as divisional chemist.

Senior assistant secretary of the B.E.A., North Western Division, **Mr.V. Bowen,** A.C.I.S., A.A.C.C.A., has been appointed secretary of the No. 7 Sub-Area of the North Western Electricity Board. He commenced employment with the Salford Corporation Electricity Department in January, 1920, and progressed to the senior commercial position of chief administrative assistant, to which he was appointed in December, 1945. In February, 1948, he became executive officer at Salford, and took up his present position in August, 1948.

Mr. E. H. Hickery, B.A., has relinquished his appointment as part-time member of the South Wales Electricity Board.

Leaving his position as chief generation engineer (construction) to the Merseyside and North Wales Division, **Mr. F. H. S. Brown,** B.SC., M.I.Mech.E., A.M.I.E.E., on Monday next takes up his new post at the headquarters of the British Electricity Authority as deputy to Mr. F. Shakeshaft, the generation design engineer. Born in Birmingham and educated at King Edward's School, and later at the University of Birmingham, Mr. Brown subsequently served with the city undertaking till 1945. During that period he was shift charge engineer at Nechells and Hams Hall power stations, followed by two years as technical assistant in the Engineering Design Department engaged on the design of Hams Hall "B" station. Rejoining the Operations Department, he was boiler-house superintendent at Nechells Princes' station from 1940 to 1942, and at Hams Hall "A" from 1942 to 1945. In the latter year he jointed the West Midlands J.E.A. as assistant construction engineer, being engaged upon the design and construction of Ocker Hill and Walsall power stations. Going to Liverpool Corporation in 1947 he was responsible for the design and construction of extensions to Clarence Dock power station. At vesting date he became generation engineer (construction) for the Division, being subsequently promoted to chief.

Mr. F. H. S. Brown

At present power station superintendent at Dalmarnock generating station, South West Scotland Division, B.E.A., **Mr. E. W. Deane,** Associate I.E.E., M.Inst.F., has been chosen to fill a similar post at the Division's new Braehead power station. Born in Bridgetown, Barbados, Mr. Deane later studied at Glasgow Royal Technical College. After three years with the Galashiels Electric Supply Co. as chief assistant engineer, he joined the Scottish Southern Electric Supply Co. as station superintendent in 1920, and in 1942 became a member of the staff of the Construction Department of the Clyde Valley Electrical Power Co.

Mr. Ivan A. R. Stedeford, chairman of Tube Investments Ltd., left Britain by air last Sunday for business consultations in Canada and the United States. He will return to Britain within about fourteen days.

As from this month, the representative of Metway Electrical Industries, Ltd., in both Northern Ireland and Eire is **Mr. L. Walker.**

As successor to the late Mr. W. H. Peters, the General Electric Co., Ltd., has nominated **Mr. W. A. C. Maskell,** B.SC.(ENG), M.I.E.E., to be general manager of the company's radio and television works at Coventry. Mr. Maskell joined the G.E.C. as a graduate apprentice in 1925, and after a period as an assistant in the radio laboratory at Coventry, was appointed to the staff at head office. During the war he was chief engineer of the firm's radio works in the Bradford area, and when those works closed in 1946, returned to head office, to become deputy manager of the radio department, under Mr. M. M. Macqueen. The position of deputy manager of the radio department is being filled by **Mr. R. G. E. Mayo,** who joined the G.E.C. in 1927. He has held various appointments in both the radio works and the sales branches of the company, and was transferred to head office in 1946 as assistant manager, radio and television sales.

Mr. W. A. C. Maskell

Although he retired last month from the position of sub-area manager to the South Western Electricity Board, **Mr. L. V. Turner,** M.I.E.E., is not severing his connection with the Board, for he has now been appointed to be a part-time member of the Board—a capital way of utilising his extensive and valuable experience in the Taunton area. He succeeds the late Mr. Frank Forrest, C.B.E., M INST C.E., M.I.E.E., M.I.Mech.E.

To mark the recent retirement of **Mr. F. Nicholls,** M.I.E.E., F.INST.F., from the position of manager of No. 4 sub area of the Yorkshire Electricity Board, a formal ceremony was held in Leeds. Our picture shows **Mr. D. M. Lapper,** O.B.E., chairman of the Board, presenting a cheque to Mr. Nicholls (right) on that occasion.

Mr. Nicholls, right, receiving his cheque

At present deputy station superintendent at Kingston "B" power station, South Eastern Division, B.E.A., **Mr. G. R. Todd,** B.SC., A.M.I.E.E., has been appointed station superintendent at Dalmarnock, Glasgow, power station of the South West Scotland Division. Mr. Todd gained technical education at University College, Dundee, and practical training with Metropolitan Vickers Electrical Co., after which he returned to Dundee, served with the Corporation Electricity Department until 1947. In that year he came south as boiler house charge engineer at Deptford West power station of the London Power Co., and in the following year took up his present post at Kingston. Mr. Todd assumes his new duties on July 2.

Mr. G. R. Todd

Elected the new president of the Electrical Contractors' Association for the ensuing year is **Mr. Stanley N. Watkins,** managing director of the Birmingham concern of that name. His connection with the E.C.A. dates back to 1921, since when he has figured prominently in Association matters; he is a past chairman of the Birmingham branch; was elected to the Council in 1938, and as vice-president in 1949. He has also served on the Midland Sectional Board since 1933 and is a past chairman of the Board. Born in "Brum," Mr. Watkins was educated at King Edward's Grammar School, Aston, and afterwards obtained training with Knight and Ludlow, Ltd., and the British Thomson-Houston Co., Ltd., Rugby. Elected vice-presidents of the Association were **Mr. W. T. Trace** (of W. H. Trace & Son, Ltd.), and **Mr. A. F. Plummer** (of Shoolbred Electrical Co., Ltd.)

Mr. S. N. Watkins

The Brush Electrical Engineering Co., Ltd., announce that the Board has appointed **Mr. Miles Beevor,** at present chief secretary and legal adviser to the British Transport Commission, to be deputy managing director to the company. He takes up his new position at the beginning of July. From 1943 to 1947 he was chief legal adviser to the L.N.E.R., and in the latter year became acting chief general manager of that railway.

The Simplex Electric Co. Ltd., announce that **Mr. J. Morison** has been appointed deputy manager of their Newcastle Branch.

OBITUARY

Mr. H. Tattersall, for over 50 years managing director of Henry Tattersall Ltd., plumbing, heating and electrical engineers of Rochdale, died on May 30.

We note the death on May 29 of **Major A.C. Peebles,** O.B.E., M.I.Mech.E., M.I.E.E., F.R.S.A., consulting engineer, partner in the Edinburgh firm of Begg, Peebles and Roos. Educated at Heriot-Watt College, Edinburgh University, and the State Electro-Technical College, Chemnitz, he was apprenticed to the business of his father, the late Mr. D. Bruce Peebles. It was chiefly due to the son that his father established his electrical department originally at Tay Works, Bonnington, but with the rapid expansion of the business move was made to East Pilton, and in 1903 a limited company formed with the title Bruce Peebles and Co. Ltd. Major A. C. Peebles then started in business on his own in 1908, but changed over to the professional side in 1928. As a volunteer in the 1914-18 war, he held various appointments, including that of officer-in-charge Defence Electric Lights, Forth Garrison, and officer-in-charge Machinery, Scottish Command. During this time he was responsible for the installation of many electric plants at important points.

WILLS.—Mr. W. W. Kublin, managing director of the Britannia Electric Lamp Works Ltd., left £66,299 gross (£58,657 net value).

Maj. J. Wayne-Morgan, M.C., D.L., M.I.Mech.E., M.I.E.E., consulting engineer, left £11,961 gross (£11,688 net value).

NEW LITERATURE

"The Engineer" Directory and Buyer's Guide

THIS 1951 edition of a popular and handy reference book shows a further increase in size. As before, it provides lists of addresses, telephone numbers and telegraphic addresses of over 1,000 manufacturers of engineering products. Trade associations, too, are given, together with an extensive buyer's guide and trade names. Although restriction of the list of firms detracts from its usefulness, it is still excellent value for money. Published by Morgan Bros., 28 Essex Street, Strand, W.C.2, 384 pages, 8½ in. by 5½ in. Price 2s. 6d.

Engineering Metrology

by K. J. Hume, B.S., A.M.I.Mech.E., M.I.Prod.E.

ALTHOUGH accurate measurement is essential to modern engineering, the actual details of securing ultimate standards and working substandards are not always fully appreciated. Mr. Hume has set out to explain the important principles involved, and some of the practice, too, and has succeeded, somewhat surprisingly, in making interesting as well as instructive reading out of slip gauges, dividing engines, surface plates and the other potentially "dry" subjects he tackles. His book should be of great value to students preparing for H.N.C., I. Mechanical Engineers' and I. Production Engineers' examinations in metrology; further than this, it should prove a valuable reference book for all of those who require some background knowledge of measurement problems and practice. Published by Macdonald and Co. (Publishers) Ltd., 293 pages, 8½ in. by 5½ in. Price 18s.

Radio Technology

by B. F. Weller, A.M.I.E.E.

ELEMENTARY electrical theory is taken as read in this well established text book on radio engineering, which is now appearing in its third edition. The accent is on the engineering side, and as the author puts it in his preface, "far more space has been given to practical considerations of transmitter, receiver and aerial design, rather than to matters of more academic interest." Applied throughout the book, this idea results in a clear, readable and not too highly mathematical text.

The early sections of the book are devoted to fundamental tuned circuit theory and to the characteristics of thermionic valves, and with the valve as a power amplifier. A description of transmitters and of transmission theory is then followed by a parallel treatment of receivers, while final chapters cover aerial systems and radiation and ultra high-frequency technique. Published by Chapman and Hall, 420 pages, 8½ in. by 5¼ in. Third edition, price 30s.

Electrical Communications

by A. L. Albert

IN this American textbook the whole range of communications is considered from a strictly technical and engineering aspect. The aim is to present the undergraduate student with a picture of the entire industry without specialisation in any one branch. After a survey of the early history of the subject the fundamentals of acoustics and of electrical methods of communication are discussed. Descriptions of various types of transducers are followed by lengthy chapters on electric networks, transmission lines and cables and wave guides. Electronic applications come next, and then telegraph systems are described, with telephone methods following. Final chapters deal with radio propagation, radio systems generally, and interference and noise. Published by Chapman and Hall, 593 pages, 9 in. by 6 in. Third edition, price 52s.

BOOK RECEIVED

A Century of British Progress, *1851-1951.* Reprinted lectures on British industry, commerce, science, engineering, design and education. Published by the Royal Society of Arts, Adelphi, London W.C.2, 79 pages, 9½ in. by 6 in. Price 3s. 6d.

Diesel Electrics for Main Lines

Paxman/B.T.H. range extended to 2,000 h.p. for overseas railways

ALTHOUGH it is doubtful if the diesel-electric main line locomotive will ever be an economic proposition in this country, British manufacturers are responsible for many large units shipped abroad, and at present, while the American manufacturers are fully occupied with home orders, a considerable demand is available from the Colonies and Dominions. For this reason the range of Ruston-Paxman YL/B.T.H. diesel-electric units is of considerable interest. This series covers powers per engine between 600 b.h.p. and 2,000 b.h.p., the units being of vee construction with 8, 12 and 16 cylinders as required.

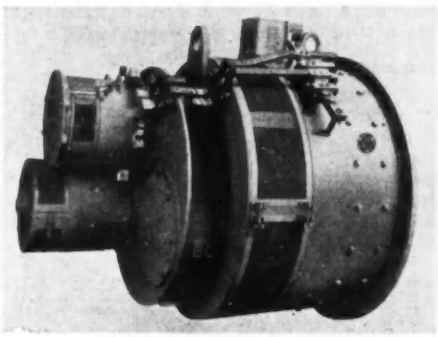
Electrical Equipment

The electrical equipment included in the unit consists of the main d.c. generator, a shunt wound machine with separate excitation, the exciter, again separately excited from the locomotive auxiliary supply and an auxiliary generator which works with an automatic voltage regulator to give a constant voltage supply. Provision is also made for the fitting of a third generator to supply power for radiator fans.

The exciter is also fitted with an auxiliary winding carrying the armature current of the main generator. Output of the set is thus regulated by variation in engine-speed and regulation of the strength of the shunt field.

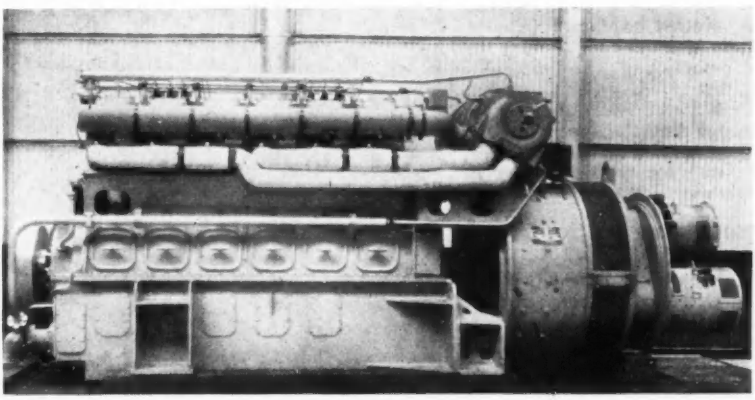
The reason for using a simple shunt wound generator with a differential exciter instead of the more usual three-winding machine is to reduce weight and to use a much lighter control field.

As can be seen from the illustration, the auxiliary machines are spigot-mounted on the gearbox which is integral with the endshield of the main generator. These machines are driven by gearing and are clustered round a central gearwheel on an extension of the main generator shaft.



The B.T.H. traction generator exciter and aux. generator

Speaking at a Press visit to see a 12 cylinder unit on the test bed, Sir John Greaves, Managing Director of Davey Paxman Ltd., said that he did not believe that in the U.K. coal would be superseded by oil. The field for diesel-electrics lay in the export markets of the world. In common with all other British manufacturers of diesel engines, the Company was at a great disadvantage in trying to get into these markets because there was no real call for diesel-electric traction on the Home railways.



General view of the 12-cylinder unit showing the system of mounting the auxiliaries

The C.E.B. of Malaya

New Organisation's First Year

STILL in its infancy in regard to electricity development, the Federation of Malaya poses a number of pertinent problems to the newly formed Central Electricity Board. Firstly, there is too great a dependency on two industries—tin and rubber, but the problem of widening the country's economy is not easy of solution. Secondly, the development of cheap hydro-electric power is essential if a viable industrial economy is to exist in 10 or 20 years' time, it is stated in the first annual report of the Central Electricity Board of Malaya, a copy of which we have just received. As the report points out, the power demand is extremely sensitive to a retraction in the world demand for tin, but hydro power enables low cost production to be continued, whereas dependence on imported fuel would make a bad situation worse.

The Board's position can be more easily appreciated when it is realised that it is now responsible for 34 power stations—totalling 39,880 kW, of which one steam station accounts for 26,500 kW, one hydro for 2,280 kW, the remaining 11,100 kW being the capacity of 32 diesel stations.

Small Sets

The nature of the country, of course, has made it necessary to install many small local generating plants. In some cases supply is commenced on a six-hour basis, is later improved to 12 hours and eventually to a 24-hour supply. The ultimate aim in such instances is to connect supplies to the bulk supply system, where possible, and transfer the small diesel plant elsewhere.

At many of the Board's smaller diesel stations there is a substantial demand only between 6.30 p.m. and 10.30 p.m. During the remainder of the night power is only needed for street lamps, and during the day for fans and refrigerators. Such a load is obviously not very economical, and a plan has been evolved to install in such stations one large set to meet the peak evening load and a small automatic set to run without attention from 10.30 p.m. to 6.30 p.m. the following evening. By so doing the station staff is reduced to one shift only, with a corresponding reduction in wage costs.

New Steam Station

Considerable importance is being attached to the inauguration of the new Connaught Bridge power station, the first section of which is expected to be in operation by September 1953. This will house two Parsons 20 MW turbo-alternators and four Babcock and Wilcox 120 klb/hr. boilers. The second stage will also be 40 MW.

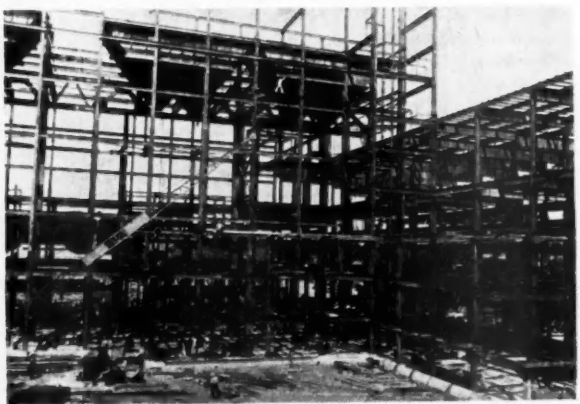
There were hopes, too, that further progress might be made in the scheme for the development of hydro-electric power in the Cameron Highlands area near the Perak-Selangor boundary, a 100 MW project on which the consulting engineers had reported favourably, but the tragic death last year of Mr. B. Gates, the Board's hydro-electric engineer, as the result of bandit activity, has halted investigations.

The Board's first annual report, covering the 12 months ended August 31 last, shows that at the latter date, h.t. transmission and distribution lines totalled some 358 miles. Two major extensions were made to the Selangor 33 kV network, while work commenced on the 66 kV interconnect or between the new Connaught Bridge power station and the old Bungsar station. Another 100 mile 66 kV line from Kuala Lumpur to Malacca is also planned.

In the Board's first year of operations, a total of 159·4 million units were generated, of which 115·1 millions were by steam, 14·4 milions by hydro and 29·9 millions by diesel stations. Average price per unit sold was 9·65 cents (2·70d.), there being 50,006 consumers.

Of all units sold, over 75% were used in tin mining alone, only 11·9% being for lighting and domestic installations. But with a net profit of $1,761,897 at the end of its first year, the Board can look forward with confidence.

It is of interest to note that the set up of the new Central Electricity Board corresponds roughly to our B.E.A. Area Board. There are Northern, Eastern, Central and Southern Regions, each under the control of a superintending electrical engineer responsible to the chief engineer.



Erecting steel work for the Connaught Bridge power station

British Plastics Exhibition

First Specialised Exhibition and Convention opens at Olympia

SINCE 1945 Britain's exports of plastic materials have increased eightfold. Annual figures are now 35,000 tons of goods worth £12,000,000 ranging from battery plates to baby pants, from lenses to lighting fittings and telephones to toothbrushes, so it is small wonder that our enterprising contemporary *British Plastics* decided that the industry needed an exhibition and convention devoted entirely to matters directly concerning it. Result is the first Exhibition and Convention which opened at Olympia yesterday.

With the patronage and full co-operation of the British Plastics Federation, trade association of the industry, the Exhibition attempts and succeeds in appealing to three distinct sections of the community—directly to the plastics industry itself, to those industries who do or might use plastics materials or finished products and to the general public itself.

The Convention itself has a programme of 37 papers to be read during the duration of the Exhibition, June 6-16. Here again three levels of interest are concerned, the public being invited to film shows and a Housewives' Quiz with Kenneth Horne, of BBC fame, in the chair.

Throughout the Convention a programme of films is being shown from 5 till 7.30 p.m. each weekday. Three films regarded as being truly representative of the industry are being featured.

Very many firms are now engaged in the production of plastics materials and in the processing and fabrication of component parts for various other industries.

Bakelite Ltd. show a wide range of materials for essential applications in industry. Particular emphasis is laid on their use in aircraft engineering, radar and telecommunications, and electrical and mechanical engineering. Of unusual interest are the special materials developed to possess a required range of properties in order that they may perform some task which could not be performed in precisely the same way by any other material.

Typical of such applications are the miniature valve bases on view.

A G.E.C. "star" turn

The main feature of the display of The Telegraph Construction and Maintenance Co. Ltd. is a demonstration of a dipping technique employing Telcothene powder, which is polythene processed by Telcon to provide specific characteristics. Telcothene powder has become established as a material which may be used to impart to a diverse range of components a coating embodying qualities of corrosion resistance and electrical insulation.

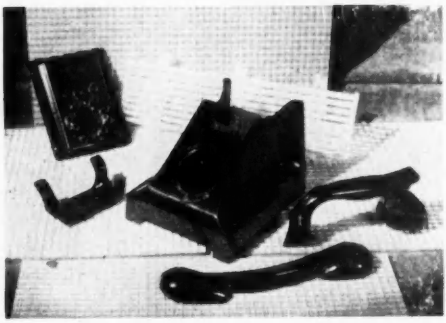
It is available in many shades.

The development of this powder followed the success of Telcothene, many applications of which are also exhibited. Among the mouldings there are examples of acid containers, electrical insulators, plugs and sockets, and various non-technical products. In rod form Telcothene is manufactured in standard lengths of varying diameters. It is designed to be used in conjunction with machining operations, and is X-rayed to ensure the absence of air voids.

Also on display in a range of colours and sizes are examples of Telcothene sleeving, to which a lacquered cotton braiding can be applied overall if required.

Examples of Telcon products since 1845, in both moulded and extruded gutta percha and Telcothene, are also displayed, including moulded gutta percha articles which were exhibited at the famous 1851 exhibition.

The exhibits of G.E.C. consist of two main groups: (1) plant for use in the plastics industries, and (2) products of the Witton Moulded



EKCO's contribution includes this Plastic "lattice"

Insulation Works of the G.E.C. operating in its capacity of "moulders to the trade."

The use of high-frequency heating equipment for the pre-heating of plastic pellets is shown by a working exhibit of a 2 kW plastic pre-heater. This equipment will preheat up to 1½ lb. of plastic material per minute, with a maximum capacity of several pounds.

For users who do not require the rapid and uniform rate of heating which is a characteristic of high-frequency preheaters, a preheating oven operated by infra-red radiation is shown.

In the field of thermoplastic materials, a standard softening plant is exhibited, in which 20 Osram infra-red reflector lamps, mounted in a reflecting housing, radiate downwards on to a bed 30 in. by 24 in.

The exhibits also include a selection from the range of G.E.C. infra-red reflector units for housing for Osram reflector lamps.

The exhibits include a selection from the very wide range of mouldings produced at the Witton Moulded Insulation Works of the G.E.C. This plant is adaptable to the production of mouldings in all types of thermo-setting and thermoplastic materials, and examples are displayed of this "moulders to trade" activity.

"Warerite Plastics in Industry" is the theme of Warerite Ltd.'s stand. These decorative laminated sheets with their smooth, "non-snag" surface have been found excellent materials for inspection tables, etc.

The display of United Ebonite and Lorival tells the story of the company's activities in the large-scale production of plastic or ebonite components and finished articles for industry and the home. The stand is divided into two halves, the first showing some of the many domestic products with which Lorival is associated, and the other detailing and showing examples of mouldings for Britain's factories.

The scope of the E. K. Cole Plastics Division as trade moulders is well illustrated on the company's stand. Ekco's customers for moulded parts include such names as Frigidaire, Varley, Goblin, the G.P.O., Murphy, Philco and Regentone, among others.

In all, over a hundred items are being exhibited ranging from small electrical components to large cabinets and long strips.

So many of the well-known and lesser-known firms are exhibiting that one can only make a brief survey of those exhibits that we feel our readers cannot under any circumstances afford to miss. They include :—Thomas de la Rue and Co., whose stand evidences the theme "Mr. Everyman in Plastic Land." The advantages of "Formica" in the home, and in the workshop, of Delaron in mouldings for telephones, radio and television sets, in power station equipment, signalling apparatus and instruments are emphasised. Tufnol Ltd., manufacturers and fabricators of the well-known laminate which has so many applications. The paper base-brands of Tufnol are high grade electrical insulators, but other brands are used for M.V. circuits when components are required for mechanical service as well as electrical insulations.

Ashdowns Ltd., are showing a number of mouldings together with fabrications in Perspex and other thermoplastic materials and some extrusions in polyvinylchloride. Ashlam synthetic resin-bonded boards for electrical insulation and Ashlam S.V.D. paper mouldings, together with low pressure glass fibre laminated sheets and mouldings and silicone bonded glass fabrics are shown.

In the machinery section there is much of especial interest to us. The range of equipment displayed by Funditor Ltd. includes heating plant, marking machines, heat-sealing machines and blocking presses. An outstanding point in favour of Funditor machines is the simplicity of operation.

The B.I.P. Group is well represented. All five subsidiary companies : Beetle Products Co., Beetle Bond, The Streetly Life Co. Ltd., B.I.P. Tools Ltd. and B.I.P. Engineering Ltd. The induction heated tools and the press plants are especially interesting.

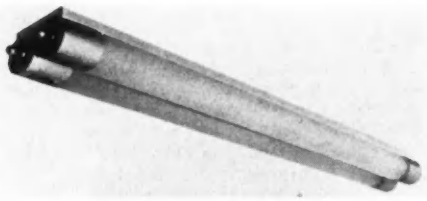
I.C.I.'s stand is mainly devoted to a description of the activities of the Plastics Division Technical Service and development department. Special attention is drawn to the work in connection with the use of "Perspex" in the lighting industry.

Perhaps not "of" but definitely "with" the plastics industry is the display of "Rozalex" Ltd. Well known in all industries are the company's dermatitis barrier preparations.

The BUYER'S *Column*

Stylish Mazda Decorative Fittings

A NEW group of Mazda fluorescent lamp fittings designed in decorative style is now available from BRITISH THOMSON HOUSTON CO. LTD., Crown House, Aldwych, W.C.2, under the series Catalogue No. 1230. They have clean lines that enable them to fit in well with almost any type of interior architecture, and will be particularly suitable for offices, shops, hotels and similar premises where good appearance is as important as operational efficiency. The standard range comprises fittings for use with either single or twin 5-ft. 80-watt or 4-ft. 40-watt Mazda fluorescent lamps. They may be supplied to special order for single or twin 3-ft. 30-watt and for twin 2-ft. 40-watt or 20-watt lamps. All are designed for mounting flush on ceiling or walls.



The new B.T.H. fittings have clean lines

Auxiliary gear is housed in a back channel of sheet steel, finished in off-white egg-shell enamel, and the lamps are enclosed in reeded "Perspex" diffusers. The latter are supported by anodised aluminium end-covers in a standard colour of unbrightened gold, these being easily detachable in order to facilitate maintenance.

Wood Engraving the "Acru" way

FOR men who are clever with wood and men who are not, in fact for everybody who works in some way with wood, the ACRU ELECTRIC TOOL MANUFACTURING CO., LTD., 123 Hyde Road, Ardwick, Manchester 12, have produced an engraving pencil. It can be used for many purposes other than wood engraving. Any material from glass to rubber can be embossed with foils which the firm supply in ten different colours. The resultant embossed writing is extremely durable. A complete set comprising an Acru wood engraving tool with 5 ft. 2-core cable and four different brass bits together with a pad of embossing foil is listed at 25s.

"Mem-Spel & -Span"

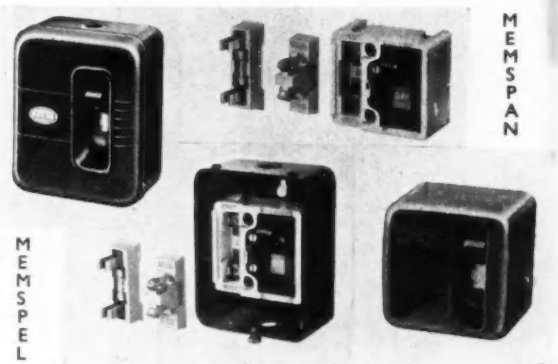
NOW taking pride of place in the range of switch and fuse gear produced by the MIDLAND ELECTRIC MANUFACTURING CO. LTD., Reddings Lane, Tyseley, Birmingham 11, are two new items "Memspel" and "Memspan." These two new ranges of switchfuses and splitters have been designed from the outset for single pole and neutral work on a.c. circuits.

Breaking away from a prevailing idea that single pole and neutral gear was an adaptation of d.p. types MEM have taken advantage of a reduction in the number of fuses to produce neat and attractive units. In these the switch mechanism and fuses have been placed alongside and the operating lever set in the front of the switch recessed to prevent inadvertent movement. All external projections have been avoided in both designs—"Memspan" units having all insulated covers and "Memspel" gear using sheet steel cases which have the advantage of strength combined with lightness and providing a smooth surface for the enamel.

The ranges include 15, 30 and 60 amp switchfuses and 2, 3 and 4-way splitters. They comply generally with BS.861 and 816, and have been styled to accommodate either "Memcert" H.R.C. cartridge fuses or rewirable fuses as preferred. The two types of fuse carriers are interchangeable.

Special attention has been paid to the wiring facilities. In the metal-class range, dual-purpose cable bushes are used on the 15 and 21 amp. units. As supplied, they will accept t.r.s. or lead covered cable, the bush fitting the cable snugly to keep out dust, etc. On the larger sizes a special plastic plug is used. For use as a cable bush, the centre of the plug may be knocked out; whilst both plastic and metal bushes can be quickly removed in all metal clad switches, leaving a hole for conduit entry.

The all-insulated types have reduced thickness sections in the plastic cover at top and bottom,



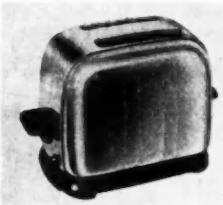
which can be knocked away as necessary to allow cable entry, or cables can be brought through a mounting board at the back of the switch and taken to the terminals.

Price Increases

AN announcement by MULLARD, LTD., Century House, Shaftesbury Avenue, London W.C.2, states that as from June 1 the list prices of their photographic electronic flash tubes are as follows: LSD3 and 3a, £6 10s.; LSO7, £8; LSD5, £10.

New Automatic Toaster by G.E.C.

A NEW automatic electric toaster designed by THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, will shortly be available. An attractive addition to the company's range of household electrical appliances, it is simple to handle and toasts two slices of bread in one operation. The degree of toasting can be regulated by the turn of a knob. The heating time is controlled; when the bread is toasted the current is automatically switched off and the toast raised for easy withdrawal. The toaster is finished in chromium plate with black Bakelite handles and base. It stands 7⅛ ins. high, has a width of 11 ins., and a depth of 5¾ ins. Supplied for use on alternating current only. Voltage ranges: 100/110 V, 200/210 V, 220/230 V, 240/250 V. It has a current consumption of 1,250 watts. Cat. No. D.5625. Price £5.

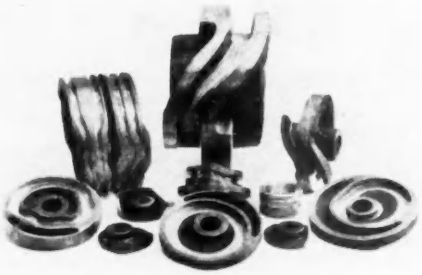


Important addition to any home!

T.E.I.—cam cutters now!

IT is perhaps a little unexpected that THORN ELECTRICAL INDUSTRIES, LTD., of 105 Judd Street, W.C.2, best known in this country as manufacturers of Atlas lamps and lighting, Ferguson radio and television, and Mary Ann domestic appliances, should have entered the field of precision cam-cutting. The growth of the company's manufacturing organisation has justified a considerable investment in high-speed automatic production machinery, and in order to manufacture this specialised equipment the company has established its own facilities for machine design and construction. This department has installed one of the few Universal Cam Millers in Europe, which is capable of producing a full range of cams for incorporation in lamp and valve making machinery, or other equipment in which complicated high-precision cams are used.

Apart from certain special cams which have been cut for research organisation in connection with Ministry contracts, the company has produced cams for machines employed in the following industries: book manufacture, plastic moulding, aircraft, brick making, machine-tool making, coil winding, textiles, confectionery, glass working, etc., and has cut cams for eight lamp and valve companies.



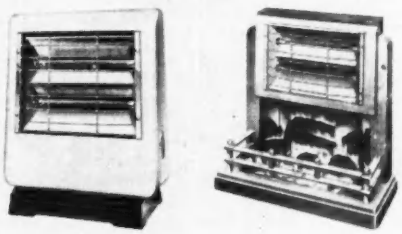
Some examples of T.E.I. work

Two New Fires by Berrys

INTRODUCED by BERRY'S ELECTRIC LTD., Touchbutton House, Newman St., London, W.1, at a time when thousands of overseas visitors are with us in Britain are two fine models: No. 441 "Mayberry" and No. 628 "Vanguard."

The first is a Magicoal fire of modern pleasant design fitted with a special safety guard. Finished in warm silver with polished rustless front bars and element assembly the fire has heating elements rated at 2 kW which are controlled by two recessed switches. Complete with 6 ft. of 3-core cable the unit is priced at £10 10s. plus £7 14s. 4d. purchase tax.

"Vanguard" is an appropriate name for the new No. 628 model, for it certainly leads the way in functional efficiency and exterior design, two factors which in this model have been combined with great success. Loading is again 2 kW, but a recessed switch permits half loading. Safety is a point which has received much attention here. A special guard is fitted and a safety switch automatically breaks should the model fall or be lifted. Prices of this model are £4 19s. 6d. plus £3 12s. 2d. p. tax or £5 15s. plus £4 4s. 6d. p. tax with the safety switch.

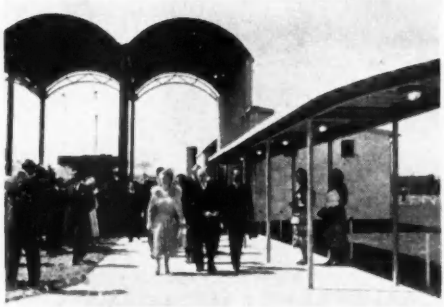


"Vanguard" and "Mayberry" ready for the coming season

FARM of the FUTURE

E.D.A. AT BELFAST FESTIVAL SHOW

WHEN Her Majesty the Queen and Princess Margaret visited the Belfast Festival of Britain exhibition at Castlereagh last week-end, they showed great interest in the Farm of the Future, an illustration of what modern electrical and mechanical techniques can do for the countryman. E.D.A. helped in the preparation of this exhibit, and it was fitting that the Queen should stop, during her tour of the farm, to speak to Dame Caroline Haslett, Vice President of the E.D.A. council. Dame



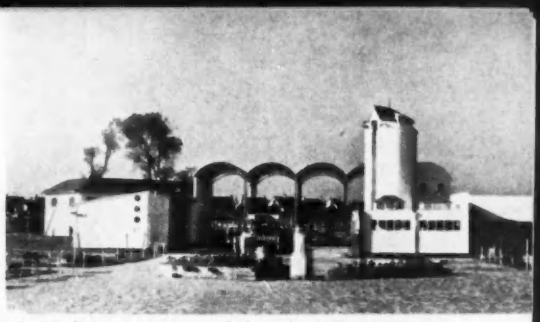
Caroline presented to Her Majesty, Mr. C. T. Melling, Chairman of E.D.A., and Mrs. Melling, Mr. E. R. Wilkinson, immediate past chairman, and Mrs. Wilkinson, and Mr. V. W. Dale, General Manager and Secretary, and Mrs. Dale.

In her inspection of the farmhouse, the Queen remarked particularly on the excellence of the kitchen and on the lighting of the house.

E.D.A. Lunch

Previously, on Thursday, the Northern Ireland area committee of E.D.A. had given a luncheon in Belfast at which the Rev. Robert More, Minister of Agriculture in the Northern Ireland Government, said that the government regarded rural electrification as an essential task. This fact was later confirmed by Sir William Robinson, chairman of the Electricity Board for Northern Ireland, who spoke appreciatively of the Government's financial support.

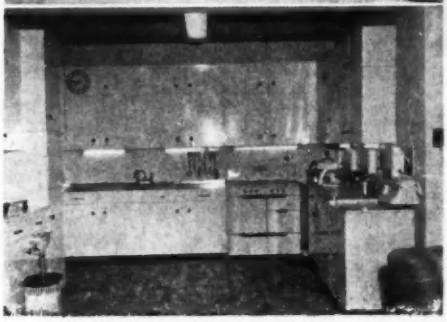
B.E.A. speakers at the luncheon included Mr. E. R. Wilkinson, Mr. C. T. Melling, and Mr. H. F. Carpenter, secretary of the B.E.A.



Mr. Wilkinson suggested that the "Farm of the Future" might be regarded as unorthodox, but there were points in it which could be adopted in every farm. He emphasised that electricity on the farm was not merely for lighting and radio, but should be used to save labour and make the farm a more economical proposition.

Amongst Northern Ireland representatives present was Mr. John Martin, deputy president of the Ulster Farmers' Union. In the course of his speech, he said that he appreciated the financial difficulties of complete rural electrification, but considered it vital, not only to the farming community, but also to the prosperity of the country as a whole.

A general view of the all-electric Farm of the Future is seen at the top of the page, with the silo particularly prominent. The silo supports fluorescent floodlights for farmyard illumination. On the left is seen Her Majesty The Queen inspecting the main farm buildings. In the farmhouse the ground floor is taken up with the farmer's office (below), storage rooms, and garage. All the living accommodation, including the extensive all-electric kitchen (at the bottom) is upstairs



CABLE for the *275 kV GRID*

Extension of existing techniques

WITH the planning and construction of the B.E.A.'s 275 kV superimposed Grid now progressing, the need is certain to arrive for cables suitable for operation at this voltage. Last week we were able to see the steps involved in the manufacture of such a cable, when we visited by courtesy of B. I. Callender's Cables Ltd. their Erith works.

The cable at present going through the shops is of single core construction, and follows the general lines of the B.I.C.C. impregnated pressure design. When on load it is under a nitrogen gas pressure of 200 lb/sq in., and the dielectric subjected to a maximum stress at the conductor surface of 110 kV/cm.

At the centre of the cable is an 0·175 sq in. conductor, composed of 91/0·103 in. tinned copper wires, which are died down to ensure smoothness and reduce voltage stress concentration, and covered with a screen of metallised paper. Paper insulation comes next, with a total radial thickness of 1·005 in., bringing the overall diameter of the cable at this stage of manufacture up to 3·129 in. 230 tapes of paper are lapped on, and in spite of the use of what is stated to be the largest paper lapping machine in Great Britain, two passes are necessary. The paper lapping machines also apply a metallised screen over the paper, and over this there is a copper woven fabric tape, which ensures positive contact between the metallised paper and the lead sheath, as well as protecting the paper.

Schedule of Cable Construction

	Radial Thickness in.	Cumulative Diameter in.
Conductor, died down and screened		1·119
Insulation	1·005	3·129
Metalised paper screen	0·005	3·139
Copper woven fabric tape	0·015	3·169
Clearance	0·035	3·239
Lead sheath	0·120	3·479
Cotton bedding for reinforcement	0·010	3·499
1% tin bronze reinforcement	0·036	3·571
Rubber bitumen sandwich serving	0·21	3·99

Vacuum drying and impregnation of the paper comes next, with close control of pressure and temperature throughout the process. The cable is then taken to a Glover lead press, where a lead-tin alloy is extruded over the cable. The thickness of the lead sheath is 0·120 in., and it is applied with a radial clearance of 0·035 in. between itself and the c.w.f. tape, to permit of gas transference along the cable in operation.

Step by step build-up of the 275 kV cable. The lead sheath is applied with a small radial clearance to permit gas transference

Reinforcing comes next, and since the cable is a single core design, it is necessary to use a non-ferrous metal for this purpose. An 0·010 in. thick cotton bedding is placed over the lead sheath, and the first layer of 1% tin-bronze tape is applied. This consists of narrow tapes having a very long lay, and thus giving strength in a longitudinal direction against the effects of the 200 lb/sq in. gas pressure. Directly over this layer comes wider tapes, applied with a very short lay, so as to give circumferential reinforcement to the lead sheath.

Finally, cable serving. Protection against corrosion is provided by a sandwich serving of rubber and compounded bitumen tapes, together with the application of a bitumen type compound.

In its finished state, the cable will have an overall diameter of 3·99 in., and when buried in the ground under average soil conditions, will have a current carrying capacity of 530 amps —corresponding to a three-phase load of about 250 MVA.

THE WEEK

COMMERCE *in news* INDUSTRY

New Scrap Prices

DUE to the recent increases in the price of copper and nickel the Minister of Supply has made a new order raising the maximum prices of non-ferrous scrap. The Non-Ferrous Metals Prices (No. 5) Order came into force on Monday. It also provides that builders' merchants may be paid a commission of 1½% on re-melted lead, and fixes a price of £115 per ton for old zinc free from tar. Among the new prices are the following:

COPPER	£	CUPRO-NICKEL	£
Clean Bright untinned wire and commutator bar	222	70/30 used condenser tubes	217
Same wire tinned ...	217	BRASS	
No. 1 wire	207	Cuttings	190
Clean Heavy ...	202	Rods and fuse scrap not burned ...	178
No. 2 wire	197	Swarf	168

Useful European Contacts

THE opening of two of the four main offices of the newly-formed European Purchasing Commission was announced last week by the Ministry of Supply. They began to function on Friday last. Directors and addresses are Mr. Norman Doley, 107 Rue Belliard, Brussels, and Mr. A. S. Radford, 5 Mehlemer Strasse, Marienburg, Cologne. The addresses of other offices in Paris and Milan will be announced later. The purpose of the Commission (as reported in our issue of May 17) is to encourage the procurement of stores and equipment required for defence, but the offices by reason of their positions, will also endeavour to help private manufacturers establish contacts and buy necessary goods on the Continent.

Overseas Scholarships

ENGINEERING graduates from Pakistan have arrived in this country for two years' training in British workshops under the new overseas scholarships scheme organised by the Federation of British Industries. The four students from Pakistan form the vanguard of many others expected from Australia, Ceylon, Iran, Kenya, Sudan and Uruguay during the next two months. They will receive their training at Glenfield and Kennedy Ltd., Kilmarnock, English Steel Corporation Ltd., B.S.A. Tools Ltd., and the B.E.A.

The object of the scheme is to provide fully-trained technicians, urgently needed to assist the economic development of participating nations It will, of course, serve to strengthen the trade ties between the U.K. and those countries. Twenty countries are taking part, and it is hoped to award some 100 scholarships each year. Sixty companies have offered vacancies for the first two years.

S.E.E.B. acquire New Premises

THE South Eastern Electricity Board has bought the premises of an antique furniture dealer in Guildford High Street at a price understood to be in the region of £45,000. The additional space will facilitate the co-ordination of various offices, stores and showrooms at present scattered through the town, and enable the Board to relinquish their showrooms in Municipal Buildings and offices in the former Civic Restaurant. For several months now the town council has been pressing for the vacation of showrooms at Municipal Buildings which are urgently required for office accommodation. The S.E.E.B. also proposes to leave premises in Onslow Street and release the space for extensions to the bus station Apart from having an excellent position in the centre of the town, the new building extends some distance to the rear and should prove adequate for all the Board's needs in the district.

B.E.A. Employees Victimised ?

OVER 4,000 members of the National Union of Public Employees in the electrical industry had been badgered, victimised and denied the right to make representations to their nationalised employers, it was alleged at the union's Scarborough conference last week. An executive motion was adopted declaring that as the union was unable to represent its members in the electrical and gas industries, it should cease to recruit members from those sources. It was also agreed that those employed by the nationalised industries would be free to continue as members but could transfer their allegiance to other unions if they so desired.

The union which had seized the nationalised

The First Half-Century

Experience has taught most electrical people to distrust any new storage cell until it has stood the test of time, and also that iron is not a good thing in a battery, whether primary or secondary. But it is quite possible that Mr. Edison has succeeded in his light storage battery where others have failed with the same materials, and if that proves to be the case it will be good news for the automobilist as well as the traction people generally.—*From our issue of June 6, 1901.*

conciliation machinery was now making it quite clear that N.U.P.E. members could either join its organisation or "stew in their own juice," it was stated. Members who remained loyal to the Public Employees Union had been told in no uncertain manner that their regrading claims, promotion and grievances would not be considered. The speaker said that an assurance would be sought from the B.E.A. that those men who remained members of the union would be protected.

York's new Signalbox

RAILWAY passengers travelling along any of the 820 different routes which pass through York will, unconsciously perhaps, reap the benefits of the new electro-mechanically controlled signalling installation which recently replaced eight mechanically operated signal boxes. The new nerve centre at this important rail junction is believed to be one of the largest railway route relay interlocking schemes in the world and cost British Railways in the region of £500,000. It enables only four signalmen to direct all traffic in and around York station.

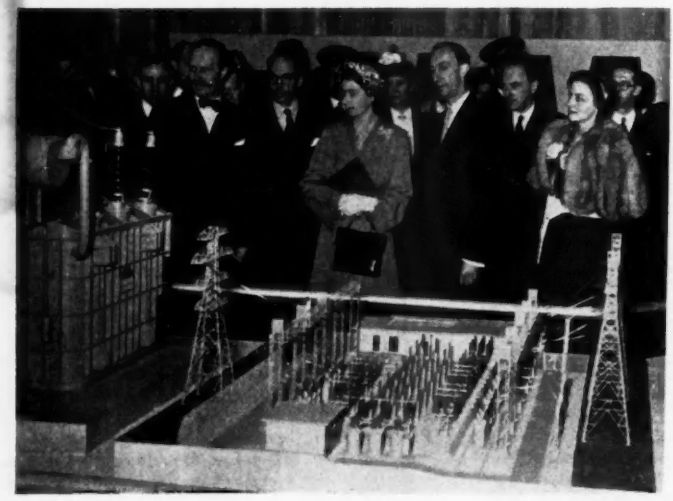
Over 5,400 miniature lamps have been fitted to one panel, 50 ft in length, which gives a complete picture of 33¼ miles of track. Previously the old boxes comprised an intricate network of 867 levers, 74 signals and 157 sets of points, all of which are now controlled from the new box. An instance of increased efficiency is that one junction formerly controlled by an 80-lever box is now controlled by only 12 switches. The system is operated entirely from public supplies of electricity but in view of possible power cuts an alternative source of supply has been installed, the changeover from one to another being effected within ten seconds. Westinghouse Brake and Signal Co., Ltd. were responsible for the installation.

Batti-Wallahs Luncheon

PRINCIPAL speaker at the Batti-Wallahs luncheon last Wednesday was Lord Verulam, who chose as his subject the generation of power from the wind. In America, he said, sales of small scale wind generators (up to 1 kW) were in excess of 10,000 sets/annum. It had been estimated that the known resources of hydro-electric power in the world totalled about 5×10^8 kW and about 1/10th of this had been harnessed. Windpower, however, had been estimated at 2×10^{10} kW. There was thus a considerable source of available power as yet untapped. He gave some details of several wind-power projects which had been built or proposed in the past, and then dealt with the Enfield Cable project in which air was expelled from the hollow blades by centrifugal force. The partial vacuum formed was used to suck air up the mast through a turbine located at ground level, and the turbine drove a generator. This machine was to have a blade tip dia. of 78 ft, with a top speed of 238 ft/sec. Outgoing air would be about 900 cub ft/sec at 15-16 m.p.h. It was proposed to use an induction generator to allow for easy paralleling on the Grid. Erection of this project is due to be completed by the end of next year.

Traders censure B.E.A. Activities

A NUMBER of resolutions expressing disapproval of the nationalised electrical industry's activities were proposed at the National Chamber of Trades' conference at Hastings last week. As announced in our issue of May 24, the conference urged that Area Boards should not be allowed to compete unfairly with private retailers and contractors. Delegates also called on the Chancellor of the Exchequer to inquire into the B.E.A.'s hire purchase trading with a view to introducing



Our illustration shows H.R.H. Princess Elizabeth viewing the English Electric Co.'s composite Loch Sloy models exhibit in the hydro-electric section of the Industrial Power Exhibition at Kelvin Hall, Glasgow. This was just one of many English Electric displays chosen to represent British industry in the various large Festival Exhibitions. The company feels justly proud of its contributions and has produced a small brochure cataloguing all its exhibits. Incidentally, E.E.'s 165 kV air-blast circuit-breaker is the centre-piece of the Electricity section at Kelvin Hall.

The effective use of laylights made by Benjamin Electric achieving a remarkably neat appearance in Somerset County Council's central repair department at Wells

a limiting factor similar to that binding traders who had to use finance houses. Both these resolutions were passed.

A third resolution, proposed by Halifax traders, expressed concern at the preferential treatment which appeared to be allowed both Electricity and Gas Boards in the occupation of retail premises at special rateable values. It was claimed that private traders had to pay a larger proportion of rates in order to keep the Boards in business. One speaker pointed out that the Corporations received a share of the total sum apportioned by the Central Authority for the whole country, but rates were not paid direct to the Corporations. He cited an instance where a borough received £59,000 in rates from the electricity undertaking prior to nationalisation, but nothing since. Delegates also approved this resolution.

Effective Use of Laylights

AN UNUSUAL lighting installation in which all fittings have been arranged behind laylights has recently been completed in the paint shop of the County of Somerset central repair department at Wells. The adequate protection provided by the laylights has facilitated the use of ordinary industrial type reflectors in place of flameproof equipment. In addition, one cannot help commenting on the remarkably neat appearance achieved in this instance. Vitreous enamelled R.L.M. dispersive reflectors were used and suitably spaced in relation to the laylights to produce uniformity of illumination throughout the shop. There are three rows of six fittings and one of five fittings. Benjamin Electric Ltd. were responsible for the installation and supply of lighting units.

Scholarship and Bursary

THE Junior Institution of Engineers has announced the offer of the Maudsley Scholarship, worth £125 for one year. Candidates must be under 26, and although they need not be members of the Institution must be eligible for membership. As the name of the scholarship implies, the offer has been made through the generosity of the Maudsley Society. Applications should be addressed to the Secretary by July 31. We learn that the Institution also offers for annual competition, the Durham Bursary of £20 to the candidate submitting the best thesis on some engineering, technical or scientific subjects. Final date for receipt of theses is August 1.

N.Z. Import Licensing

FOLLOWING the announcement that the New Zealand Board of Trade were investigating a proposal for the exemption of import licensing of certain goods, including electric cookers, refrigerators and washing machines, from other than scheduled countries, objections to such a move were made. The N.Z. B.o.T. is now asking that any firm or organisation likely to be materially affected by the continuance of the import licensing of those goods, and desiring to lodge an objection to its continuance, should send a statement of objections (five copies) to Mr. R. F. Wilson, acting secretary, G.P.O. Box 494, Wellington, N.Z., by June 22.

Instrument Maintenance

A NEW scheme of courses and examinations in instrument maintenance has been announced by the City and Guilds of London Institute. The scheme is intended to meet the needs of mechanics and technicians concerned in the maintenance, repair and installation of instruments used for process and production control in industrial plants. It has been drawn up by an authoritative advisory committee including representatives of industry, the Society of Instrument Technology, Ministries of Supply, Fuel and Power and Education, major engineering professional institutions and associations concerned with technical education. The course of part-time study will take five years. A pamphlet containing regulations and syllabuses will be available shortly from the Institute, 31 Brechin Place, S.W.7, price 6d.

Raw Materials Problem Surveyed

A SURVEY on the current shortage of raw materials in this country was recently carried out by Aims of Industry Ltd. over a cross-section of manufacturing establishments in Britain. Main

The turbine house at Portishead, near Bristol, showing the six Metropolitan-Vickers turbo-generator sets which have a total capacity of nearly 250 MW. Portishead is easily the largest generating station in the S.W. Division of B.E.A. Twenty years ago there were two 20,625 kW turbo-generator sets and later additions comprised two 51,250 kW and two 52,000 kW machines. The last two sets, installed after the war, generate at 33 kV. All the turbo-generators with condensing plant and auxiliary equipment, the switchgear and transformers, were made by Metrovick

conclusion reached was that those shortages would both prevent factories from achieving a 40% increase in output on the 1938 total and the extra £500 million in export earnings urged in this year's Economic Survey.

The disastrous impact of steel shortage was vividly exposed, cuts of over 50% being sustained with similar cuts in iron, zinc, brass, copper and aluminium. It was found that some steel cuts had been drastic, a London firm of galvanised wire makers, for example, suffering an 80% cut. A Rotherham firm of boiler makers had to work with 100 tons less steel a month, while a manufacturer in East Anglia was not accepting orders due for delivery before 1952. It was found that heavy loads of steel plate and sheets were allegedly piling up at the mills because of insufficient railway wagons to take them to factories.

Firms interviewed did, however, venture to suggest remedies. Many said bulk buying should end and firms allowed to obtain their own supplies. Some favoured rationing, supplies being allocated according to bona fide needs. The majority maintained that quotas should be based on needs during the past six months.

Open Day at Chelmsford

THE Chelmsford works of Crompton Parkinson Ltd. held their "Open Day" towards the end of last month when over 3,000 of the employees' relations and friends took the opportunity of viewing the factory which has been a prominent landmark in the town since the turn of the century. Visitors were invited for either a morning or afternoon conducted tour lasting about three hours, during which time they were able to walk over the whole of the 40-acre factory site. Guests included members of the firm's London office staff who could see how their paper-work tied up with the practical side of the business. Each visitor received a souvenir programme giving a brief account of C.P. history, and in this connection also, an exhibition had been arranged to give an overall picture of the organisation.

Control of B.E.M. Ltd., Acquired

Mr. D. Z. de Ferranti, who resigned his seat on the board of Ferranti, Ltd., in January last, and started his own group of companies, has further extended his activities by acquiring from Meters, Ltd., over 95% of the issued 39,500 Ordinary shares of £1 each in British Electric Meters, Ltd. The remaining issued capital consists of 48,000 4½% Cumulative Preference shares of £1 each fully paid. British Electric Meters, Ltd. occupy a factory of 80,000 sq ft at Bangor, North Wales.

Welsh Hydro-electric Scheme

VARIOUS opinions on the development of Welsh power resources were expressed recently at Ruthin by Denbighshire Rural Community Council. It was suggested that public authorities in Wales should meet to consider a T.V.A. scheme. One member asked if the hydro-electric project would be of any benefit to rural Wales as it might be used solely to boost the English grid system as, he understood, was the case with the Cwm Dyli power station. In regard to Scotland, special provision had been made to ensure that priority was given to local consumers, and such a clause should also be included in the Welsh Electricity Act. The question of amenities was raised again when the chairman of the county council said development was possible without creating an eyesore, but the primary concern should be to take modern improvements into the home.

Export Restrictions Continue

RESTRICTIONS on exports of semi-manufacture of copper and its alloys are to remain in force for a further period of three months from the end of June, the Board of Trade has announced. Since April 1 exports of this kind have been restricted to approximately half the rate prevailing in the first six months of 1950. The latest decision has been taken because of the continuing world shortage of raw materials involved and the heavy demand for these semi-

manufactures for essential purposes. Another announcement will be made before the end of September. The export of semi-manufactures of zinc will continue to be permitted only in exceptional circumstances.

Commercial Travellers' Appeal

WITH so many displays of talent on view at sundry arts and crafts exhibitions during the past winter, run both by the B.E.A. and private companies, the Electrical Trades Commercial Travellers' Association should feel reasonably confident of plenty of support in their appeal for similar exhibits. We learnt last week that the Association's president, Mr. H. A. Deacon, was anxious lest the general merchandise stand, at the Garden Party promoted by the U.C.T.A., would not reach the standards of adjoining stands run by other branches of the parent association. The garden party is being held in the grounds of the Royal Commercial Travellers' School at Hatch End, Middlesex, on June 23. No gift, we understand, is too small or too large, but there appears to be a dearth of home-made garments and fancy needlework. If members of the industry cannot supply these, or their wives were too busy, any other contributions will be equally welcomed. Gifts should be sent to Mr. S. Johnson, 4 The Firs, Lawrie Park Avenue, Sydenham, S.E.26.

NEWS IN BRIEF

The Annual General Meeting of the National Register of Electrical Installation Contractors is to be held at 2.30 p.m. on June 11, at the I.E.E., Savoy Place, W.C.2.

Stoke Newington Borough Council is to ask London boroughs to consider a suitable by-law protecting the public against the potential source of danger where metal scaffolding became live through faulty electric circuits.

Of the 48 students at St. Neots Technical Institute who won awards this year, 34 were employees of the Eastern Electricity Board and six of the B.E.A. The awards were presented by Col. A. E. Knights, E.E.B.'s Fens sub-area manager.

Approval has been given for an extension to Hoover Ltd.'s High Wycombe factory. Plastic moulded commutators, "Dustette" cleaners, switches, and spare parts for cleaners are made at the works, of which 60% are exported to the U.S. and Canada.

A five-day summer school on "The Technology of Synthetic Resin Adhesives" is being organised by Aero Research Ltd., and will take place at St. Catherine's College, Cambridge, between September 23 and 29.

Questions in Parliament

Generating Plant for Russia

Asked for the value of electrical generating equipment exported from the U.K., Sir Hartley Shawcross gave the figure (including parts) for 1950 as £16,357,000 and for the first four months of 1951 as £4,075,000; the value pro rata for the whole of 1951 would be £12,226,000. Thereupon Mr. Nabarro asked if in view of the effects of power cuts the time was not propitious to reconsider export policy for such vital equipment? To this the Minister replied that such policy was constantly under review. But power cuts had not arisen as a result of exports of generating plant. In the main this consisted of small or medium type generators. A further question on the export of such equipment to the U.S.S.R. followed. Answering this, the President of the Board of Trade said exports to the Soviet Union of electrical generating sets and generators (including parts) amounted in 1950 to £6,078,159 and to £389,685 in the current year up till April 30. The exports had been mostly small portable and medium size generating sets. Russian orders for the portable sets, which constituted a large proportion of these exports in 1950, were completed before the end of the year. There had been adequate capacity to meet home demands for these types of equipment, but the Government would continue to watch the situation. He understood that the majority of these sets sent to Russia were used for felling timber. On a point by Sir Arnold Gridley, he said that about 4,000 oil-driven sets of a total capacity of some 225,000 kW were exported to the U.S.S.R. in 1949 and 1950. The majority were of 50 kW capacity. Also, 52 alternators of various types, with a total rated output of about 250,000 kW in 1948 and 1949 and one turbo-alternator set of 25,000 kW in 1950, were delivered under the war-time civil supplies agreement. In addition 24 500 kW steam-driven generating sets with boilers, and 30 240 kW steam generating sets without boilers, were delivered to the U.S.S.R. during 1949 and 1950. Total values of U.K. exports of electrical machinery to the Soviet Union were £2,186,000 in 1948, £4,975,000 in 1949, and £6,822,000 in 1950.

Guards for Electric Fires?

The President of the Board of Trade was asked if, in view of the large numbers of accidents resulting from the use of unprotected electric fires, he would introduce legislation to make compulsory the provision of safety guards on all such fires or radiators? He replied that an inter-Departmental Committee was at present considering the whole question.

Power Cuts

When questioned about plant capacity and power cuts, Mr. Noel-Baker said he hoped that the British Electricity Authority would commission more than 1,000 MW of new plant in 1951. He was considering what further measures could be taken to reduce the frequency and severity of power cuts, and to mitigate the loss and inconvenience which they caused.

Electric Supply News

Ayrshire

The Ayrshire Burghs Association is to ask the South-West Scotland Electricity Board for a reply to its previous query as to how the Board's charges were fixed. The Board had already proposed to charge £15 per municipal house for the installation of electricity, but would reduce this to £3 in all-electric houses. Provost A. M. Clark, of Kilmarnock, who presided, said there was "something radically wrong with the charges" and local authorities were dissatisfied. The former Ayrshire Electricity Board, he said, had installed electricity for £4 15s. 9d. per house, had at one time a reserve of £1,000,000, and had been able to hand over a substantial sum when the industry was nationalised.

Boldon

Until the North Eastern Electricity Board can introduce a standardised procedure for fortnightly collections from all council-house tenants throughout the area, it is prepared to accept payment by instalment of quarterly accounts in the Boldon area. This is the outcome of a conference between Boldon Council Housing Committee and representatives of the Wear Sub-Area of the Board when the proposals for the fortnightly collection from consumers on housing estates were outlined. The Wear Sub-Area has agreed that instalments of any amount should be paid weekly, fortnightly or monthly to its offices in East Boldon.

Co. Cork

The town of Castletownbere and the peninsula of Beara are to have electricity after several years of agitation for a supply. It is expected that preparations for extension of the current from Glengarriff, 22 miles away, will commence soon, and it is hoped that the supply cables will be erected before winter sets in.

Cumberland

The Border Rural District Council has approved an alternative route for the 275 kV overhead line from Carlisle to Newcastle.

Douglas (I.O.M.)

The Corporation is to present a petition to Tynwald asking for permission to introduce a Bill to suspend sinking fund payment for five years in respect of electricity installation borrowings.

Eire

New restrictions in the use of electricity were introduced by the Electricity Supply Board last Thursday. The use of electricity for space heating, outside signs and displays and for shop-window lighting is prohibited, and consumption for electric storage water heating is to be 50% of last year's figures. Electricity for all purposes other than motive power, industrial process heating, traction and public lighting, is reduced to 75% of last summer's consumption. The E.S.B., it is stated, is facing the greatest crisis of its existence. The main contributing factor is the action of certain employees at the Pigeon House power station in placing a ban on the working of overtime. Because of this step, taken seven weeks ago, the output of the station has dropped 2,000,000 units weekly, it was disclosed by the chairman and other members of the Board at a conference last week. This deficiency has had to be drawn from water storage for the Ardnacrusha station, which is now at a dangerously low level. In any event, it will be necessary to impose power cuts. The refusal of the men to work overtime has seriously upset the programme of plant overhaul, it is stated. Further meetings in an attempt to end the dispute were held last week-end.

North of Scotland

The North of Scotland Hydro-Electric Board has announced that consumers in Gairloch, Aultbea and Poolewe district of Ross-shire and the Strathglass district of Inverness-shire are to pay less for their electricity which is now produced by water power. The Board's water power tariff is now to apply.

The Board last week connected the village of Tarland, Aberdeenshire, to its distribution lines. More than 30 homes in the village have been given a supply and a further 80 will be connected shortly. Provision is being made for the installation of street lighting in the village and it is hoped to have 32 sodium lamps in operation before the winter.

LIGHTING SCHEMES

Ballyclare (Antrim).—The U.D.C. has approved in principle the provision of fluorescent street lighting for the town.

Dover R.D.C.—The Ministry of Local Government and Planning has given consent to the borrowing of £1,925 for the provision of street lighting in the rural district.

Finsbury.—A recommendation that 1,100 side street lamps in the borough should be converted to electricity was approved in principle at last Thursday's meeting of the Council.

Nottingham.—At the recent meeting of the Corporation Lighting Committee, it was reported that under the conversion scheme the city now had 7,084 electric lamps, with 5,571 gas lamps still to be converted to electricity. An increase of 100% in wilful damage to street lamps on housing estates was also reported.

Southport.—The Corporation publicity and attractions committee has decided to go ahead with a Festival of Britain permanent illuminations scheme for the whole of the pier. The committee bought a considerable amount of electrical equipment in anticipation of the scheme last year, but it was deferred when the budget for the current year was cut.

West Riding.—The County Council is to be asked to contribute to the cost of improving the lighting of county roads in the Colne Valley, where the urban council is to introduce a scheme for the electrification of the street lighting.

Company Activities

British Industrial Plastics

Following consent of H.M. Treasury, the directors are making an issue of 2,500,000 2/- shares at 5/- each, on the rate of two for five held.

Lightfoot Refrigeration, Ltd.

For 1950, the trading profit is £87,501 (*£116,621*). Final dividend is again 5%, making 8%, after charging taxation of £36,666 (*£52,056*), and depreciation £22,234 (*£19,166*), the net profit is £28,601 (*£45,399*). To general reserve £10,000 (*£25,000*), and carried forward, £45,972 (*£43,847*).

London Electric Wire Co. and Smiths Ltd.

Consolidated trading surplus, etc., for 1950 is £928,408 (*£832,811*). After providing for depreciation, audit fees, and amounts set aside for provisions, the balance is £768,536 (*£672,978*). Taxation absorbs a further £436,209 (*£280,746*). To general reserve £162,884 and dividend equalisation reserve £50,000. There is a final ordinary dividend of 6% (on increased capital), making 10%. It is proposed that from July 1, the 315,930 new Ordinary shares be converted into £315,930 Ordinary stock and be transferable in amounts and multiples of £1.

Siemens Bros. Ltd.

An offer has been made to the authorities concerned to allow existing stockholders to purchase the 450,000 Ordinary shares now in the hands of the Custodian of Enemy Property—to which we referred on May 3—General Gough, chairman of Siemens Bros., reveals in his latest annual statement. The postion is certainly unusual. The 450,000 shares were issued by arrangement in 1929, to the German firm Siemens and Halske, against the issue of a then equivalent value of that concern's shares to Siemens Brothers Ltd., he states. Naturally, the latter's directors are anxious about the disposal of the stock. They feel that those stock holders who have borne the provision of reserves against the uncertain value of this holding should be the preferred parties so far as the acquisition of the expropriated stock is concerned. In any case, they claim that "a company should not, as a result of war, be liable to find that stock, representing 15% of the voting power of the company, passes to parties whose interests may not align with those of the company." Discussions have already taken place, following inability of the company, through circumstances beyond its control, to provide for the purchase of the shares in 1949 by persons nominated by it, and a further offer is being arranged.

Consolidated trading profit for 1950 is £1,364,603 (*£915,077*), plus income from investments £111,629 (*£73,729*). After providing for taxation, £497,527 (*£276,895*), depreciation £285,978 (*£237,489*), the net profit is £688,841 (*£514,759*), of which £630,585 relates to Siemens Brothers. Transferred to capital redemption reserve £50,000, to reserve in respect of initial allowances £27,250, to contingencies £175,000, to general reserve £35,000, dividends, including Ordinary 7½% plus 2½% cash bonus, take £340,000, leaving £724,021 carried forward.

Vactric Ltd.

No Preference nor Ordinary dividend is recommended for the year to March 31 last, in view of loan repayment obligations, programme of capital expenditure, etc. The preliminary statement shows a group trading surplus, after all interest payments, of £279,441 (*£130,144*). After applying the balance of loss brought forward from previous year, £29,177, the accumulated profit is £97,255.

Worthington-Simpson Ltd.

Trading profit for 1950 is £556,183 (*£432,052*). Depreciation takes £31,305 (*£27,826*), directors' emoluments £16,547 (*£15,388*), bonus issue expenses £3,331, pensions £8,671 (*£8,538*), taxation £294,375 (*£227,000*), etc., leaving a net profit of £201,375 (*£152,644*).

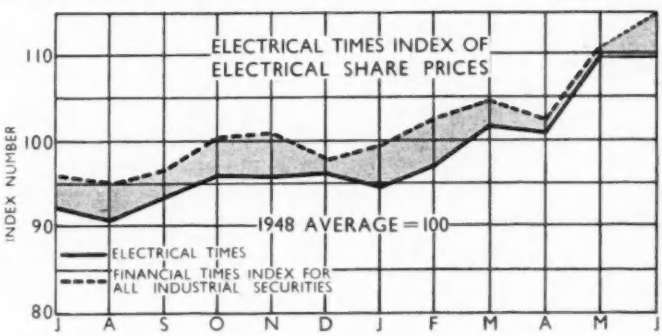
Dividends Declared

General Cable Manufacturing Co. Interim dividend of 12% (*same*).

Plessey Co. Interim of 10% (*same*), payable on June 30.

Southern Areas Electric Corpn., Ltd. There is to be no dividend for 1950. Group net loss is £5,995 (*profit £19,456*).

Waite and Son. Dividend of 10% (*same*), and bonus 5% (*nil*). Profit £22,358 (*£19,301*).



While the index for all industrial shares continued to rise during May, electrical share prices remained steady. The *Financial Times* index for the former rose from 111·7 to 115·9. The difference between *Electrical Times'* figures for April and May was a rise of only 0·1, the latest figure being 109·6. Figures are based on average prices ruling during 1948

Commercial Information

CONTRACTS OPEN

HOME

June 8.—Blairgowrie and Rattray T.C. Electric light installation in 24 houses at Altamount. Johnston and Baxter, architects.

June 8.—Doncaster R.D.C. Electrical work in 118 houses. J. A. Williams, surveyor, Nether Hall.

June 9.—Prestonpans T.C. Electrical installation in erection of 16 houses at Ayres Wynd and Nethershot Rd. R. and A. K. Smith, Quantity Surveyors, 4 Forres St., Edinburgh 3

June 9.—Swansea T.C. Electrical installation at "Haroldsmoor" and "Thanemoor" in Mumbles Rd. (approx. 100 points). Applications by above date to Borough Architect, Guildhall. Deposit £2.

June 11.—Hull. Electrical installation to Buckingham St. school. City Architect, Guildhall. Deposit £1 1s.

June 11.—Rossclare. Electrical alterations at Killadeas Hospital for N. Ireland Tuberculosis Authority. Applications to W. Harvey, 27 Adelaide St., Belfast. Deposit £3 3s.

June 11.—West Hartlepool T.C. Electrical installation in residential nursery at Hollymount, Wooler Rd. Borough Architect, Municipal Buildings.

June 11.—Worthing T.C. Rewiring of electric circuits in approximately 130 houses on S. Farm estate. Borough Engineer and Surveyor, Town Hall. Deposit £3. 3s.

June 12.—Bishop's Stortford U.D.C. Electrical installation in 32 dwellings off Apton Rd. Engineer and Surveyor, Council House, Causeway.

June 13.—Liverpool. Instruments for electrical engineering laboratory and workshop at Riversdale Technical College. Director of Education, 14 St. Thomas St., Liverpool 1.

June 13.—Milnrow U.D.C. Electrical work, wiring, etc., for 50 flats now being built at Firgrove. Council's Surveyor, Council Offices, Milnrow, Lancs.

June 15.—Oswestry T.C. Provision, erection and wiring of 29 concrete columns, 12 varied brackets and one central suspension fitting, with 42 lanterns and H.P.M.V. lamp, gear, time-switches, etc., on Swansea-Manchester trunk road. Borough Surveyor, Guildhall. (See May 17 issue.)

June 16.—Enfield U.D.C. Provision and laying of cables, service switchgear and switching pillars and connection to 128 lamp columns along about 3 miles of Gt. Cambridge Rd. Applications by above date to Engineer and Surveyor, Frank Lee, 7 Little Park Gardens, Enfield. Deposit £2 2s. (See May 31 issue.)

June 16.—N. Ireland. Electrical installation to surgeons' residence at Tyrone Co. Hospital. D. B. T. Scott, Secretary, W. Tyrone Hospital Management Committee.

June 16.—St. Neots U.D.C. Supply and erection of 26 concrete columns, one wall-mounting bracket, 27 lanterns with 140 W sodium lamps, auxiliary equipment and wiring for street lighting on Ipswich-Weedon trunk road A45. L. Henderson, Clerk of the Council, Council Offices, Huntingdon St., St. Neots, Hunts. Deposit £2 2s. (See May 10 issue.)

June 16.—Preston T.C. Conversion of fixed time to vehicle actuated traffic signals at four junctions. Borough Surveyor, Municipal Bldgs.

June 18.—Carlisle T.C. Electrical installation in 62 houses. City Engineer and Surveyor, 18 Fisher St., Carlisle.

June 18.—Ely R.D.C. Supply and erection of two centrifugal pumps for unscreened sewage, complete with electric motors and automatic switchgear. Silcox and Simpson, 10 Park Row, Leeds 1.

June 18.—Fleet (Hants) U.D.C. Supply of two sets of electrically driven vertical pumps with ancillary equipment, capable of pumping 300 g.p.m. Engineers, John Taylor and Sons, Artillery House, Westminster, S.W.1. Deposit £5.

June 18.—N. Ireland. Ministry of Commerce invites tenders for electrical installation in factories to be built at Limavady, Coleraine, Ballynahinch and Newcastle. Documents from Ministry at Chichester House, Chichester St., Belfast.

June 18.—Swinton and Pendlebury T.C. Rewiring for light and power installation, and supply of fittings, at Victoria House, Victoria Park, Swinton. Borough Engineer and Surveyor, Town Hall. (See May 24 issue.)

June 19.—Halifax T.C. Re-electrification of Sunnyside secondary and primary schools. Borough Engineer, Crossley St. Deposit £1 1s. (See May 24 issue.)

June 19.—Inverness T.C. Electrical work in block of 4 shops and 4 flats at Dalneigh and in similar block at Hilton. J. Blackburn, Burgh Architect, 11 High Street.

June 22.—Belfast. Supply and erection of a 75-ton overhead electric travelling crane for turbine house; two coal unloading cranes each of 150 tons per hour capacity; boiler feed pumps (4 motor driven and 1 steam turbine driven) to deliver 320,000 lb. p.h.; and band type circulating water screening plant for approx. 4 millions g.p.h. All for Victoria power station. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. in respect of each specification. (See May 31 issue.)

June 23.—Stafford T.C. Supply and erection of 82 mercury discharge lanterns with concrete columns on Wolverhampton-Stafford trunk road A449. T. H. Higson, Borough Engineer and Surveyor, Mount St., Stafford. Deposit £2 2s. (Advertised in this issue.)

June 25.—Beaconsfield (Bucks) U.D.C. Supply and erection of 24 250W mercury street lamps complete and dismantling of existing lamps on London-Oxford Rd. Engineer and Surveyor, J. H. Crosby, Council Hall, Penn Road. Deposit £2.

June 25. Bideford T.C. Supply, erection, installation of following street lighting schemes: (a) 13 250W mercury discharge lamps; (b) 239 100W tungsten lamps and 14 200W tungsten lamps. Work includes supply and erection of concrete columns, and lanterns, wiring etc.

Borough Engineer, Municipal Buildings. Deposit £3 3s.

June 25.—Clitheroe R.D.C. Provision and erection of pumping plant comprising two electric motors and pumps with automatic remote control, capable of 10,000 g.p.h. Consulting engineer, Arnold Brooksbank, The Exchange, Bradford. Deposit £2 2s.

June 26.—Enniskillen T.C. Installation of fluorescent concealed lighting in assembly hall of Town Hall. Borough Surveyor's Office, Town Hall.

June 28.—Frimley and Camberley U.D.C. Installation of electric lighting in 118 houses on various sites. Engineer and Surveyor, Municipal Buildings, Camberley. (Advertised in this issue.)

June 29.—Sunderland. Electrical installation in a number of schools in the borough. Borough Architect, Grange House, Stockton Rd. Deposit £2 2s. (Advertised in this issue).

July 2.—Clare. Supply of (among other items) electric air cooled stationary compressor. County Engineer, County House, Ennis.

July 5.—Manchester. Electrical installation at Button Lane Primary School, Wythenshawe. City Architect, Town Hall. Deposit £1 1s. (Advertised in this issue.)

July 13.—Belfast. Supply and erection of automatic chlorinating plant at Harbour power station. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. (Advertised in this issue.)

July 23.—Tees Valley Water Board. Heating installation at the low lift and high lift pumping stations and filtration buildings, Darlington (deposit £5 5s.), and supply and erection of electrically-driven centrifugal pumping plant at Long Newton (deposit £10 10s.). Separate contracts. Applications to T. S. R. Winter, Engineer and General Manager of Board, Corporation Rd., Middlesbrough.

Sept. 3.—Dublin. Electricity Supply Board invites tenders for supply, delivery and erection of one 30 MW steam driven turbo-alternator set with condensing plant, feed heating plant and auxiliaries at Ringsend power station. Generation Engineer, 27 Lower Fitzwilliam St., Dublin. Deposit £5 5s. (See May 24 issue.)

No date stated.—Forehoe and Henstead (Norfolk) R.D.C. Wiring for electric cookers and wash boilers in 110 hutments at Hethel Airfield. Housing Officer, 12 The Close, Norwich.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

June 21.—Greece. Ministry of Communications require supply of 20 tons of bi-metallic copper covered steel wire 0·1144 in. diameter. Tenders to Ministry, Reconstruction Procurement Committee, Sofokleous St. No. 7, Athens.

June 23.—Egypt. Director General, Cairo Electricity and Gas Administration want supply of 65 kms of 3 core power cable p.i.l.c. double armoured working voltage 380. Documents from Chief Inspecting Engineer, Egyptian Govt., 41 Tothill St., S.W.1. Deposit £2 1s. (Advertised in this issue).

July 3.—Uruguay. One mixing pump operated by electric motor for working asphaltic cements at 150°C, and pump, electrically driven for working kerosene of 0·82 density circulating a maximum temperature of 80°C. Administration Nacional de Combustibles Alcohol y Portland, Montevideo. B.o.T. (Ref.: CRE (IB) 61577/51)*

July 4.—Queensland. State Electricity Commission requires insulators and insulator ironwork for the 66 kV transmission line at Burdekin. B.o.T. (Ref. CRE (IB) 62027/51).*

July 9.—Egypt. Supply of 26650 a.c. watthour meters and 130 current transformers, for Director General, Cairo Electricity and Gas Administration. Documents available at Egyptian Govt. Offices, 41 Tothill St., S.W.1. Deposit £2 1s. (Advertised in this issue).

Aug. 22.—India. Manufacture, supply and erection of switchgear, power transformers and other equipment required for Pykara and Papanasam H.E. schemes and S. Kanara extensions, required by Electricity Dept., Govt. of Madras. B.o.T. (Ref. CRE (IB) 62636/51).*

Aug. 22.—Queensland. State Electricity Commission invites tenders on behalf of Capricornia Regional Electricity Ltd., for manufacture, supply, testing, etc., of four 1000kVA 11/22kV "Auto" transformers with "off load" tap changing switch, or alternatively four double wound transformers. BoT (Ref.: CRE (IB) 61862/51)*

No date stated.—Queensland. State's Railways Dept. invites tenders for design and manufacture of 12 diesel electric locomotives. Required for trips of 600 to 700 miles without refuelling, axle load not exceeding 10 tons, speed of 45 m.p.h.

Your Queries — Answered

"Sollux" health lamps, makers of? E.S.—Hanovia, Ltd., Trading Estate, Slough. (20392)

"Flexy" car washers, makers of? B.A.—Lister Equipment, Ltd., 3 Charlotte St., Manchester 1. (20397)

"Warmabed" blankets, suppliers of? M.G.—Modern Electrical Industries (Southern), Ltd., 3 Hatherley Rd., Sidcup, Kent. (20404)

"Kite" insulating beads, makers of? B.E.—Ellison Insulations, Ltd., Wellhead Lane Works, Perry Barr, Birmingham 20. (20412)

"E.N.B." contactors, makers of? L-L.—E. N. Bray, Ltd., Whipps Cross Works, Wood St., Walthamstow, E.17. (20419)

"Ladybird" lawnmowers, makers of? R.S.—A.M.I. Lawnmower Co., Ltd., 27 Whitcombe St., W.C.2. (20426)

"Marigold" clocks, address for? D.D.—The firm which made this clock went out of business about two years ago, but the Universal Electric Clock Co., 138 Kingston Rd., S.W.19, will undertake repairs. (20436)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

"Chapman" commercial water heaters, makers of? S.B. (20439)

CONTRACTS PLACED

B.E.A. 132 kV 3,500 MVA switchgear for Elstree substation, A. Reyrolle and Co., Ltd.; 132 kV overhead lines between Brighton and Three Bridges and Brighton and Worthing, Watshams Ltd.; 275 kV double-circuit overhead line between Tilbury and Elstree, J. L. Eve Construction Co. Ltd.; 132 kV overhead line between Bustleholme and Drakelow, Balfour Beatty and Co. Ltd.; 60 MVA 132/33 kV transformers and earthing transformers for Rodley substation, English Electric Co. Ltd.; and 132 kv 2,500 MVA switchgear for Currie substation, British Thomson-Houston Co. Ltd. Bulk orders for 132/33 kV transformers and earthing transformers comprised: 60 MVA: Ferranti Ltd. 14; Metropolitan-Vickers Electrical Co. Ltd., 8; British Electric Transformer Co. Ltd., 6; English Electric Co. Ltd., 6; British Thomson-Houston Co. Ltd., 2. 45 MVA: Hackbridge and Hewittic Electric Co. Ltd., 10; Fuller Electrical and Manufacturing Co. Ltd., 8; C. A. Parsons and Co. Ltd., 8; General Electric Co. Ltd., 2; Bruce Peebles and Co. Ltd., 2. 30 MVA: Johnson and Phillips Ltd., 4.

Bideford T.C. Provision of street lighting along trunk road, G.E.C. Ltd., £2,931.

Swindon T.C. Supply and installation of electrically-driven borehole pump and accessories at Ogbourne water works, Tangyes Ltd., £5,547.

TRADE NOTES

New Office.—Bill Switchgear Ltd., have now obtained office and stores accommodation in Church Street, Bedminster, Bristol. Area manager, Mr. W. L. White, is in charge.

New Depot.—Philips Electrical Ltd. have opened a new depot for Philips Light Group products, under the management of Mr. R. Winsby, at 28a Alfred St. (Tel.: Belfast 20619). This depot will carry stocks of all types of Philips lamps and lighting fittings, and trade counter service is given. Other Philips products, especially radio and television, dry shavers and flashbulbs, will continue to be distributed solely by Messrs. Eirco (Wholesale) Ltd., 29 Wellington Place, 28-30 College St., Belfast.

Change of Address.—The executive offices of Blaw Knox Ltd. moved to 90-94 Brompton Rd., S.W.1. Tel.: Kensington 5151.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	234 0 0	£220 0 0
LEAD, good soft pig (foreign)	160 0 0	136 0 0
,, ,, ,, "English" quality ...	161 10 0	
TIN (99-99.75%) ... ...(Cash)	1065-1070	—
,, (3 months)	1050-1052½	—
ALUMINIUM, commercial purity (del.)	124 0 0	—
ZINC	160 0 0	140 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	47 10 0	—
Mild Steel Tape (0·04 in.)	26 10 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Charles Amplifiers Ltd. Resolution for voluntary winding-up passed by members at meeting on May 18. This was confirmed at meeting of creditors on same day when Norman W. Osborne, C.A., 11-12 Finsbury Sq., E.C.2. was named liquidator.

Charles Amplifiers (Sales) Ltd. Resolution for voluntary winding-up passed at meeting on May 21. N. W. Osborne appointed liquidator as above.

Greater London Power Co., Ltd. Meeting of members to be held at B.E.A., Winsley St., W.1, on June 28 at 4 p.m., to receive liquidator's report.

BANKRUPTCY ACTS

First Meeting

Chelmsford. Bertie Alfred Murton, electrician, trading at 54 The Green, Writtle. Meeting at 3 Central Buildings, Matthew Parker St., S.W.1, on June 12, at 11.30 a.m., and public examination at Shire Hall, Chelmsford, on July 27, 11 a.m.

London. Frank R. Harris, trading as "Major Brian Radio" at 673 Romford Rd., Manor Park, London. Meeting was at Bankruptcy Buildings, Carey St., W.C.2, on June 6, and public examination will be at same address on July 25 at 11 a.m.

Blackburn. Stafford Green, electrical contractor, of 373 Bolton Rd., Darwen. Meeting was at Official Receiver's Office, Manchester, on June 5, and public examination will be at Court House, Victoria St., Blackburn, on June 20 at 10.30 a.m.

Release of Trustee

Birmingham. Frank Robinson, refrigerating and electrical engineer, of 100 Henshaw Rd., Small Heath, Birmingham. Trustee was R. K. Clark, 37 Temple St., Birmingham 2.

Orders Annulled and Rescinded

Brighton. Albert M. Willmore, electrical and radio engineer, trading at 45 King St., Brighton. Adjudication order, May 7, 1926 annulled, and receiving order, May 7, 1926 resci nded. Date of annulment and rescission, May 21. Debts paid in full.

Release of Liquidator

London. Chrisco Products Ltd., makers of lamp standards and shades, of Westcliff-on-Sea, Essex. Liquidator was John Torquil Murdoch Macleod, 4 Bucklersbury, E.C.4.

Dividends

Lincoln. Clarence Welbourn, electrical engineer and contractor, of 158 Hykeham Rd., Lincoln. Final dividends of 20s. in £ payable at 340 High St., Lincoln, on June 8.

London. Mulparvo Ltd., of East Sheen, Surrey, scientific instrument makers. First and final dividend of 4d. in £ payable at 75 Cheapside, London, E.C.2 on June 6.

Order on Application for Discharge

Salisbury. Richard Corbett, and Ivan A. J. Merritt, trading as "Corbett and Merritt," electrical and radio engineers, 2b Junction Rd., Andover. Date of order, May 3. Discharge suspended for two months and to take effect now as from July 3. Grounds named are refusal of an absolute order for discharge.

Application for Discharge

Salford. Arthur Smith and James Smith, trading as "J. and A. Smith," electrical contractors, at 550 Bolton Rd., Pendlebury. Hearing at Court House, Encombe Place, Salford 3, on June 25 at 10.30 a.m.

BUSINESS PROSPECTS

HOME

Ashton-under-Lyne T.C. Plans approved for 206 houses and 46 flats on Taunton estate.

Bath. Erection of blocks of flats and maisonettes comprising 42 dwellings in all, in Julian Rd. Apply to architects, Hugh Roberts and Davies, 7 Brock Street.

Birmingham. Construction of a total of 127 dwellings on Shard End site. H. J. Manzoni, City Engineer and Surveyor, Civic Centre, Birmingham 1.

Bromsgrove U.D.C. Erection of 108 houses on Charford estate. Engineer and Surveyor, Council House, Bromsgrove.

Brighton T.C. Tenders shortly to be invited for erection of 75 houses on North Brighton estate.

Bristol. W. and T. Avery Ltd., Soho Foundry, Smethwick, are to erect showrooms and offices in St. Thomas's Street.

Chester-le-Street R.D.C. Council asked to build 100 houses for miners. Architect is F. Bowman, Estate Office, Gt. North Rd., Birtley.

Chichester. Construction of 56 houses on Parklands estate. Architect is Stanley H. J. Roth, 32 Little London, Chichester.

Chippenham T.C. Construction of 28 houses on Pew Hill site. Borough Surveyor, 10 Market Place.

Consett (Durham) U.D.C. It is proposed to build shops and flats on Richard Murray estate at Blackhill.

Coventry. Plans being prepared for development of Hall Farm estate, Stoke Aldermoor, with between 600 and 700 houses, flats, schools and social service buildings.

Derbyshire. Tenders invited for erection of new old persons' home at Kirk Hallam. County Architect, St. Mary's Gate, Derby.

Dundalk U.D.C. Construction of 62 houses at Castletown site. Frank Gibney, Architect and Town Planning Consultant, 29 Merrion Sq., Dublin.

Ealing T.C. Erection of 66 houses at Northolt Park. C. W. Seddon, Borough Engineer and Surveyor, Town Hall.

East Riding. Erection of Withernsea county secondary school. County Architect, County Hall, Beverley.

Frome (Somerset) R.D.C. Plans approved for 37 houses at Nunney.

Goole (W. Riding). Installation of electric lighting proposed for Old Goole primary school at estimated cost of £1,535.

Gt. Yarmouth. It is proposed to build occupation centre for mentally defective children at estimated cost of £16,600.

Hamilton T.C. Dean of Guild Court has approved erection of 200 houses on Udston-Hillhouse site at estimated cost of £263,582.

Harrogate. Approval has been received by West Riding C.C. for erection of an art school in Victoria Avenue.

High Wycombe. Molins Machine Co. Ltd. propose to build two machine shops, drawing office and clerks' office at Saunderton.

Hitchin (Herts) U.D.C. Erection of 32 houses on Purwell Lane estate. Surveyor, Council Offices, Brand Street.

Hoddesdon (Herts) U.D.C. Ninety houses to be built over next two years for B.E.A. employees.

Islington. Proposed to build 100 flats and maisonettes on Highbury New Park site.

Leyland (Lancs). Plans approved for erection of 100 houses.

Loughborough. H. Morris Ltd. are to make large extensions to their premises at North Works, Meadow Lane. Estimated cost £63,000.

Londonderry. Erection of new primary school at Killeague, extensions to Portstewart primary school and alterations to Garvagh House. Quantity Surveyor, Crofton G. Dalzell, Diamond, Coleraine.

Newtownards R.D.C. Construction of 84 houses at Comber, Co. Down. Quantity Surveyor, Messrs. Roe, Stevenson and Sons, 33 College Gardens, Belfast.

Northants. Plans laid for extensions to Corby Technical College, £58,000, and Rushden North End county modern school, £38,900.

Nottingham. Electric lighting is to be installed in Rainworth primary school. Provision is expected to be included in 1952-53 education estimates.

Peterlee (Durham). Tenders being obtained by Peterlee Development Corp., Sholton Hall, Castle Eden, for erection of 148 houses on the Eden Lane site.

Sheerness. Kent C.C. recommended to approve improvements to electrical installation at Technical Institute. Estimated cost £1,895.

Sheffield. Erection of county primary school at Athelston. W. Geo. Davies, City Architect, Town Hall, Sheffield 1.

Stalybridge T.C. Tenders to be invited for installation of electricity at Eastwood Lodge.

Washington (Durham) U.D.C. Erection of 80 houses on Oxford Ave. site. Architect is E. M. Lawson, Barras House, Barras Bridge, Newcastle.

Wolverhampton T.C. Erection of a total of 185 dwellings under three contracts, on Castlecroft estate, Tettenhall. Director of Housing, Town Hall.

OVERSEAS

Columbia. J. Finnin y Cia Ltda., Apartardo Aereo Nr. 611, Medellin, wants to contact U.K. manufacturers of electric cables, welding electrodes, diesel and oil engines, overhead cranes, pumps, compressors, refrigerating plant, hydro-electric plant, meters and measuring instruments, porcelain insulators, etc. Mr. Colin Stanley, the firm's representative, is in this country until August, at Jasmyne Cottage, Bourne End, Bucks.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Beacon with design. 693,979. Class 7. Electricity generators; electric motors and starters; air compressors, etc. Workman Reed and Co. Ltd., Beacon Works, Hevish near Bristol.

Bicaloc. 692,090. Class 9. Electric insulated wires and metal strips and cables. British Insulated Callender's Cables Ltd., Norfolk House, Norfolk St., W.C.2.

Collaro. B689,472. Class 9. Gramophones, gramophone record changing apparatus, etc. Collaro Ltd., Ripple Works, By-Pass Rd., Barking.

Sintraposit. 693,905. Class 9. Electrodes for electric welding. Metro-Cutanit Ltd., 160, Piccadilly, W.1.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

D. and F. Processes, Ltd., 17a Queen's Rd., Brighton. General, mechanical, electrical and precision engineers, etc. Cap.: £100. Dirs.: T. J. Doran and F. G. Forfitt.

Esher Electrical Services, Ltd., Empire House, St. Martins-le-Grand, E.C.1. Electrical engineers and general electrical installation contractors, etc. Cap.: £100. Dir.: Mrs. J. E. Freeland.

Extralite (Home Sales) Ltd., 40 Church Cres., Muswell Hill, N.10. Electrical equipment specialists, etc. Cap.: £100. Dirs.: A. Moss, D. N. Friis, A. Moss and G. H. Livingston.

Grays (Axminster) Ltd., West St., Axminster, Devon. Motor and electrical engineers, and general electrical installation contractors, etc. Cap.: £5,000. Dirs.: W. H. Gray and F. Goddard.

Harold Hirst and Sons, Ltd. 68 Gt. Horton Rd., Bradford Yorks. Civil, constructional, mechanical, motor and electrical engineers, etc. Cap.: £10,000. Dirs.: F. L. Hirst and G. B. Hirst.

R. T. Young, Ltd., 15 Grange Lane, Leicester. To take over business of an electrical wholesale distributor carried on at Leicester by Richard. T. Young. Cap.: £5,000. Dirs.: R. T. Young and Mrs. V. M. Young.

H. Regan and Co., Ltd., 113 City Rd., Cardiff. Manufacturers of and dealers in artificial lighting apparatus, electrical plant, etc. Cap.: £7,000. Dirs.: H. Regan and Mrs. D. M. Regan.

S.D. Engineering, Ltd., Duracraft Works, Franklin Rd., Portslade, Sussex. Mechanical, electrical, consulting and inspecting engineers, manufacturers of and dealers in electrical apparatus, etc. Cap.: £1,000. Dir.: C. P. Stonor.

Inman Joist and Co., Ltd., 4 Whitaker Bldgs., New Victoria St., Bradford. Electrical engineers and general electrical installation contractors, etc. Cap.: £5,000. Dirs.: L. A. Inman and K. B. Joist.

MEETINGS TO NOTE

SATURDAY, JUNE 9

I.E.E. (S.W. Sub-centre).—Summer meeting in N. Devon. Tanton's Hotel, Bideford, 12 noon.

TUESDAY, JUNE 12

INCORP. PLANT ENGRS. (E. Lancs branch).—"Maintenance of Industrial Instruments," by representative of Cambridge Instruments, Ltd. Engineers' Club, Albert Sq., Manchester, 7.15 p.m.

MONDAY, JUNE 18

BRITISH GAS TURBINE WEEK at South Bank Festival site, London.

BRITISH STANDARDS EXHIBITION. Held as part of golden jubilee celebrations of British Standards. Science Museum, S. Kensington, continuing for two weeks.

BRITISH ELECT. POWER CONVENTION, held at Brighton and continuing until June 22.

BRUSH ELECTRICAL ENGINEERING CO.

(Brush Aboe Group)

Sir Ronald W. Matthews on the Continued Progress

THE sixty-second annual general meeting of the Brush Electrical Engineering Company, Ltd., was held on June 5 in London, Sir Ronald W. Matthews, D.L., N.Inst.T. (the chairman), presiding.

The following are extracts from his circulated statement:

I am pleased to be able to advise stockholders that the improvement shown in the past three years has continued. At the beginning of the year the major problem was that of maintaining sales at a high level when the post-war "seller's market" had come to an end and more normal trading conditions were returning. By the close of the year conditions were reversed under the impetus of rearmament and the problem was that of increasing manufacturing capacity to balance a strong order-book.

Having dealt at length with the development of the group organisation and of the widespread activities, the statement continues:

The board have for some time felt that the name The Brush Electrical Engineering Company, Ltd., is now by no means descriptive of the wide range of the Group's manufactures. It is not, however, thought desirable at present to change the name of the parent company, but with a view to presenting to the world a more adequate picture of the Group's activities it has been decided to use as a general description of the organisation the words "The BRUSH ABOE Group of Companies."

The input of orders both from the home market and from export markets is extremely satisfactory. It is encouraging to see the network of agents increasing under the intensive efforts of the export companies.

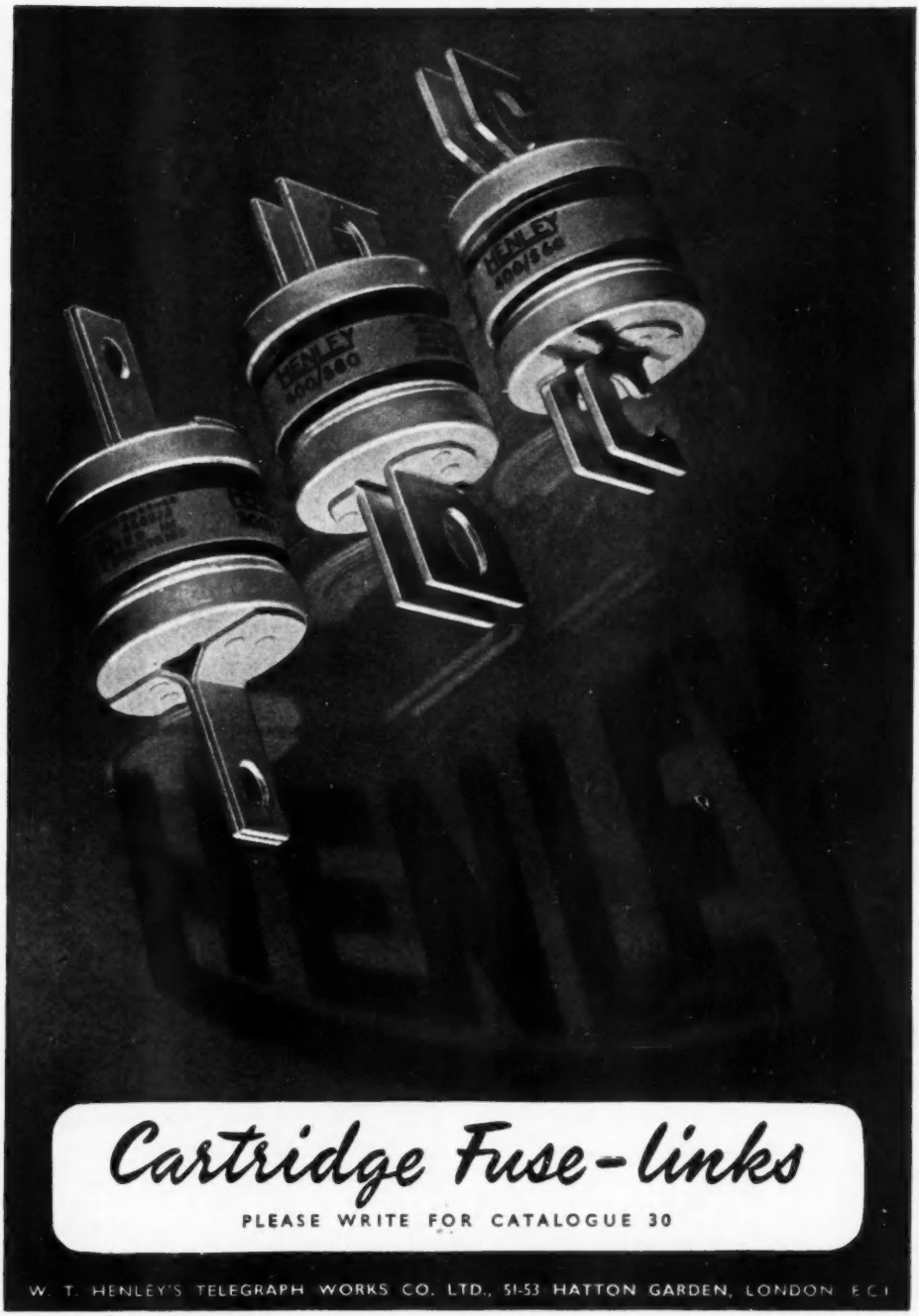
The distribution of engines has been improved and service facilities have been extended throughout the world.

Associated Tube Wells, Ltd., has obtained contracts from three Indian provinces for the drilling of 965 tube wells.

Contracts of this nature are essentially the sale of a service rather than a piece of equipment. The customer, particularly in underdeveloped territories, frequently desires to purchase not a group of machines but a complete installation that will supply him with water, electricity, or oil. These contracts stress the interdependence of the constituent companies of the Group, and only a Group of companies such as this can provide from within itself the equipment and technical ability necessary for the operation of such a contract. Similar features can be seen in the combined Group products sold by Brush Bagnall Traction, Limited, and in the substantial orders recently obtained from the Middle East for the electrification of a number of towns and villages.

We can, I feel, look back with considerable satisfaction on the success which has attended our efforts to expand our contribution to the country's overseas trade, particularly in hard-currency markets. We have entered upon the current year with a new obligation superimposed on the vital export position—the need to play our full part in meeting the requirements of the Government in connection with the rearmament programme.

The report and accounts were adopted.



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WESTON
Electrical Measuring Instruments

No. 3 . . . Portable Instruments

Representative of Weston portable instruments, is the Model S.103 — a moving iron type of instrument, designed for a wide range of measurements to first grade accuracy on both A.C. and D.C. The 6" scale is linear over the whole of its working range and a knife-edge pointer and anti-parallax mirror are provided to facilitate accurate reading. The instrument is supplied as a Milliammeter, Ammeter or Voltmeter. Full details of the Model S.103 and of the Model S.82—available in D.C., A.C. rectifier and thermocouple types, are available on request.

SANGAMO WESTON LIMITED

Enfield, Middlesex. Tel: Enfield 3434 (6 lines) and 1242 (4 lines). Grams: Sanwest, Enfield

Branches:
Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton, Brighton

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., London, W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

COUNTY BOROUGH OF SUNDERLAND LOCAL EDUCATION AUTHORITY

ELECTRICAL INSTALLATION IN VARIOUS SCHOOLS

TENDERS are invited for electrical installation proposed to be installed in various Schools in the Borough.

The work is to be carried out in accordance with the Drawings, Specifications and Conditions of Contract which may be obtained together with Form of Tender, from the Borough Architect, Grange House, Stockton Road, Sunderland, on payment of a deposit of two guineas (cheques to be made payable to "Sunderland Corporation") returnable on receipt of a bona-fide Tender. The successful Tenderer will be required to enter into an agreement, with the Council and provide a Guarantee Bond issued by an approved Company or Bank, in a sum equivalent to 15% of the total amount of Contract, for the due and complete performance of the Contract.

Sealed tenders, endorsed on the outside "Tender for Electrical Installation in various Schools," must be addressed to the Town Clerk, Town Hall, Sunderland, and delivered not later than Friday, June 29, 1951.

The Council does not bind itself to accept the lowest or any Tender.

G. S. McINTIRE,
Town Clerk and Clerk to the Local Education Authority.

Town Hall, Sunderland.
June, 1951. (L 69)

BOROUGH OF STAFFORD

Wolverhampton-Stafford Trunk Road, A.449

STREET LIGHTING

TENDERS are invited from manufacturers of street-lighting electrical equipment for the supply and erection of 82 No. Mercury Discharge Lanterns, together with present concrete columns on the trunk road within the Borough of Stafford. The drawings may be seen and copies of the specification, bill of quantities and form of tender obtained on application to Mr. T. H. Higson, B.Sc., A.M.I.C.E., Borough Engineer and Surveyor, Mount Street, Stafford, on payment of a deposit of two guineas, which will be returned on receipt of a bona-fide tender and all documents.

Tenders enclosed in a plain sealed envelope and endorsed "Street Lighting—Trunk Road, A.449," must be delivered to the undersigned not later than 12 noon on Saturday June 23, 1951. The Council do not bind themselves to accept the lowest or any tender.

T. BROUGHTON NOWELL,
Town Clerk.

Borough Hall, Stafford.
May 31, 1951. (L 45)

EGYPTIAN GOVERNMENT

TENDERS are called for by the Director General, Cairo Electricity and Gas Administration, for the supply and delivery into Stores, Cairo, of 65 Kms of 3-core Power Cable P.I. L.C., double armoured, working voltage 380.

Tenders should be submitted to The Director General, Cairo Electricity and Gas Administration, 53 Fouad El Awal Street, Cairo, Egypt, not later than noon on June 23, 1951.

Copies of the necessary conditions of tender, specification, etc., can be obtained on application to the Chief Inspecting Engineer, Egyptian Government, 41 Tothill Street, London S.W.1, against remittance of £2 1s. per set, which sum must be prepaid and is not returnable. Copies of these documents are also available for scrutiny at the above address. Cheques must be endorsed permitting transfer to an Egyptian Government account.

Reference No. 30/Elec. and Gas 3/2-174 must be quoted in all correspondence. (L 20)

CITY OF BELFAST

Electricity Department

AUTOMATIC CHLORINATING PLANT

TENDERS are invited for the supply, delivery, and erection of automatic chlorinating plant at the circulating water intake, Harbour Power Station, Belfast.

Form of tender (No. N.1056), conditions and specification, in quadruplicate, may be obtained from Messrs. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-upon-Tyne 1, on payment of a deposit of five guineas (cheques to be made payable to the Belfast Corporation Electricity Department), which deposit will be refunded provided a bona-fide tender be lodged and not withdrawn. Extra copies of the contract documents may be obtained at three guineas per set, which sum will not be returnable.

Each tender, in quadruplicate, in sealed envelope marked "Tender for Chlorinating Plant, Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, July 13, 1951.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered. The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
May 31, 1951. (L 44)

EGYPTIAN GOVERNMENT

TENDERS are called for by the Director General, Cairo Electricity and Gas Administration, for the supply and delivery into Stores, Cairo, of 26,650 a.c. Watthour Meters (2, 3, and 4 wire, single and 3-phase) and 130 Current Transformers.

Tenders should be submitted to The Director General, Cairo Electricity and Gas Administration, 53 Fouad El Awal Street, Cairo, Egypt, not later than noon on July 9, 1951.

Copies of the necessary conditions of tender, specification, etc., can be obtained on application to the Chief Inspecting Engineer, Egyptian Government, 41 Tothill Street, London S.W.1, against remittance of £2 1s. per set, which sum must be prepaid and is not returnable. Copies of these documents are also available for scrutiny at the above address. Cheques must be endorsed permitting transfer to an Egyptian Government account.

Reference No. 55/Elect. and Gas 3/2/173 must be quoted in all correspondence. (L 21)

CITY OF MANCHESTER

THE EDUCATION COMMITTEE invite tenders for the ELECTRICAL INSTALLATION required at BUTTON LANE PRIMARY SCHOOL, WYTHENSHAWE, MANCHESTER.

Specification and drawings may be obtained at the office of the City Architect, Town Hall, upon payment of £1 1s. which sum will be returned upon receipt of bona-fide tender. All cheques and postal orders are to be made payable to the order of "The Corporation of Manchester" and crossed.

Sealed tenders, enclosed in the official envelope, to be delivered at the Education Offices, Deansgate, Manchester 3, not later than 10.0 a.m. on Thursday, July 5, 1951.

The Corporation do not bind themselves to accept the lowest or any tender.

PHILIP B. DINGLE,
Town Clerk.

Town Hall, Manchester.
May, 1951. (L 1)

FRIMLEY & CAMBERLEY URBAN DISTRICT COUNCIL

Electric Lighting Installations

PRE-WAR COUNCIL HOUSES

TENDERS are invited for the installation of electric lighting in 118 pre-war council houses, the houses being situated in various parts of the Urban District.

Copies of the specification, etc., may be obtained from the Engineer and Surveyor, Municipal Buildings, Camberley.

Tenders, in a plain, sealed envelope endorsed "Council House Lighting," must reach the undersigned not later than first post on Thursday, June 28, 1951. The council does not bind itself to accept the lowest or any tender.

K. S. HARVEY,
Clerk of the Council.

Municipal Buildings, Camberley.
June 1, 1951. (L 46)

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of OPERATION SUPERINTENDENT at Swindon Generating Station.

Applicants must have had considerable experience of the operation of a modern generating station. The person appointed will be responsible for the efficiency and operation of the generating station plant (both boilers and turbines), the coaling programme, and the operation of the coal and ash handling plant and disposal operations.

Preference will be given to corporate members of one of the senior professional engineering institutions or candidates holding appropriate equivalent qualifications. The position is one in which valuable experience can be gained for more senior posts within the industry.

The salary, which is provisional, will be in accordance with Grade 6, Class "E" of the National Joint Board's Schedule, namely £627-£649 per annum.

The appointment will be terminable by one month's notice in writing on either side. The appointment is superannuable and may be subject to a satisfactory medical examination.

Application forms may be obtained from the undersigned and must be returned not later than June 22, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth.
June 2, 1951. (L 51)

BRITISH ELECTRICITY AUTHORITY

STATISTICIAN, CHIEF ENGINEER'S DEPARTMENT

APPLICATIONS are invited for a vacancy as Statistician, or Mathematician with a knowledge of statistics, to work on problems connected with load estimation and the effect of weather on load. Applicants should have a good honours degree together with some research experience.

The successful candidate will be appointed within the Third Assistant Engineer Grade of the National Joint Board Agreement at a salary of £676 per annum to £807 per annum according to qualifications and experience, rising to a maximum of £891 per annum including London Allowance. The appointment is superannuable.

Applications, stating age, present salary, and giving full details of qualifications and experience, should be forwarded to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London, W.1, so as to be received not later than June 25, 1951.

Please quote reference AE/178. (L 10)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the position of DEMONSTRATOR in the Lichfield District. Applicants should have had a good general education and the possession of a recognised diploma in Domestic Science and Electrical Housecraft will be an advantage. Duties will include the conducting of lecture demonstrations both in the Service Centres and on consumers' premises, and advice to consumers on the selection and use of electrical apparatus. Training will be given where necessary to suitable applicants. The commencing salary and conditions of service will be in accordance with the National Joint Council Grade 1, within the range of £310-£350 per annum, with further progress to £390 per annum subject to satisfactory service. The successful applicant will be required to contribute to the Board's Superannuation Scheme, if eligible. Applications, in writing, stating age, education, etc., should be forwarded within 14 days to Sub-Area Manager, Midlands Electricity Board, Darlington Street, Wolverhampton. (L 9)

MIDLANDS ELECTRICITY BOARD

Central Gloucestershire Sub-Area

APPOINTMENT OF FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER

APPLICATIONS are invited for the above post in the Stroud District of the Central Gloucestershire Sub-Area.

Applicants should have had a sound technical training with practical experience of industrial and domestic load development, and in particular contracting work, including maintenance and consumer service. Appropriate technical qualifications will be considered an advantage.

The appointment will be in accordance with N.J.B. conditions, and the salary will be Class "D," Grade 6, £594 per annum.

Applications, stating age, experience and present salary, should be forwarded within seven days to Mr. D. Holt, Sub-Area Manager, Midlands Electricity Board, 126 London Road, Gloucester.

A. STEPHENS,
Secretary.

May 25, 1951. (L 7)

CITY OF MANCHESTER

City Architect's Department

APPLICATIONS are invited for the appointment of an ELECTRICAL ENGINEERING ASSISTANT on the permanent staff.

Salary A.P.T. III—£500 to £545 per annum.

Candidates must be capable of preparing schemes for electric lighting and power installations in all types of municipal buildings and should have passed the intermediate examination of the Institute of Electrical Engineers.

The salary and conditions of service will be in accordance with the National Joint Council's Scheme of Service Conditions.

Forms of application may be obtained from and should be returned, together with not more than three recent testimonials, to Leonard C. Howitt, B.Arch., F.R.I.B.A., City Architect, Town Hall, Manchester 2, by June 25, 1951, endorsed "Electrical Engineering Assistant."

Canvassing is prohibited.

PHILIP B. DINGLE,
Town Clerk.

Town Hall, Manchester 2.
June, 1951. (L 50)

EASTERN ELECTRICITY BOARD

Essex Sub-Area

METER REPAIRER (MECHANICIAN) AND TESTER

APPLICATIONS are invited for appointments as Meter Repairer (Mechanician) and Tester at the Sub-Area Testing Stations at Creekmouth (Barking) and Southend.

The rate of pay and conditions of service will be in accordance with the National Joint Industrial Council Agreement for the Electricity Supply Industry, present rate of pay being 3s.0½d. per hour at Southend and 3s. 4½d. per hour at Barking for a five-day week of 44 hours.

Candidates should preferably have had experience in the testing and repairing of both a.c. and d.c. credit and prepayment type meters, instruments and small electro-mechanical mechanisms.

Applications, stating age, education, experience, present appointment and salary, should be submitted to the Engineer, Essex Sub-Area, Eastern Electricity Board, "Millfield," Bentley, nr. Brentwood, Essex, within fourteen days of the appearance of this advertisement.

(L 49)

NORTH WESTERN ELECTRICITY BOARD

No. 3 Sub-Area

APPOINTMENT OF DEMONSTRATORS

APPLICATIONS are invited for the appointment of Demonstrators in the Oldham and Rochdale Districts of the No. 3 Sub-Area. Candidates should be qualified to lecture and advise on the utilisation of electric cookers, washing machines, refrigerators and other domestic appliances, and to give public demonstrations in service centres and at exhibitions. Preference will be given to applicants who hold the E.A.W. Diploma. If not already held, the successful candidate will be required to obtain such diploma.

The salary for the posts, which are superannuable, will be in accordance with Grade 1 of the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry Salary Grades, i.e. £310 per annum rising by annual increments of £20 to £390 per annum. Progression beyond £350 per annum will be subject to certification that the person concerned is capable of undertaking all the duties of the grade.

Applications, stating age, training, qualifications, experience, present post and salary, and the district appointment for which application is made, should be received by E. Binns, Esq., M.I.Mech.E., A.M.I.E.E., Sub-Area Manager, The North Western Electricity Board, No. 3 Sub-Area Headquarters, Union Street, Oldham, not later than Saturday, June 16, 1951. (L 37)

EASTERN ELECTRICITY BOARD

Suffolk Sub-Area 64/51R

FIRST ASSISTANT DISTRICT ENGINEER—WOODBRIDGE DISTRICT

APPLICATIONS are invited for the appointment of a First Assistant District Engineer in the Woodbridge District of the Suffolk Sub-Area. Candidates should have had a sound technical training and wide experience in the planning, construction, operation and maintenance of h.v. and l.v. overhead and underground systems, including substations, in a predominantly rural area.

The salary for the appointment will be in accordance with Class "C," Grade 5, of the National Joint Board Salary Agreement, commencing at £604 per annum. Both future salary and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies. The successful candidate will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, stating age, education, technical qualifications and experience, with details of present appointment and salary, should be submitted to the District Manager, Woodbridge, Eastern Electricity Board, Cumberland Street, Woodbridge, Suffolk, within fourteen days of the appearance of this advertisement.

This advertisement was previously published on May 17, 1951. Applications submitted on that occasion need not be repeated. (L 48)

CROWN AGENTS FOR THE COLONIES

SENIOR INSTRUCTOR (ELECTRICAL) required by the Malayan Federation Government for 3 years with prospect of permanency. Commencing salary (including expatriation pay) according to age and experience payable in local currency equivalent at the present Government rate of exchange to £714 a year rising to £1,078 a year. Cost of living allowance between £336 and £616 a year according to salary and dependants. Free passages. Liberal leave on full salary. Candidates, under 35, must have served an apprenticeship to electrical engineering and have been employed as a Foreman on public works or large contracts. They must be thoroughly experienced in electrical installation trade practice and domestic and industrial wiring (including motors, generators, etc.) and should possess a full electrician's certificate (or final certificate in electrical engineering practice) of the City and Guilds, or equivalent. Some teaching experience desirable. Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M.25359 B. on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (L 11)

MIDLANDS ELECTRICITY BOARD

APPOINTMENT OF
THIRD ASSISTANT DISTRICT ENGINEER

APPLICATIONS are invited for the above position in the Hereford District of the Shropshire and Herefordshire Sub-Area.

Applicants should have had experience in all branches of distribution work, including erection, operation and maintenance of high and low voltage cables, overhead and underground mains, substations, etc. Appropriate technical qualifications will be considered an advantage.

Conditions of service will be in accordance with the National Joint Board Agreement, and the provisional salary will be Class "D," Grade 9, £494-£510 per annum.

Applications, stating age, present salary, full particulars of experience, and present position, should be forwarded within 14 days to Mr. W. Winwood, Manager, Shropshire and Herefordshire Sub-Area, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.
May 25, 1951. (L 6)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the appointment of ELECTRICAL DRAUGHTSMAN in the Generation (Construction) Department of this Divisional Headquarters at a salary within the range £375-£536 per annum.

This salary is provisional and subject to negotiation through the appropriate national machinery.

Applicants should preferably have obtained the Higher National Certificate and a knowledge of electrical installations and layout would be considered an advantage.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below, to whom completed forms should be returned not later than June 20, 1951.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport.
May 31, 1951. (L 52)

NORTH WESTERN ELECTRICITY BOARD

No. 5 Sub-Area

APPLICATIONS are invited for the following appointments:

SECOND ASSISTANT ENGINEER (MAINS CONSTRUCTION)

Applicants should have had considerable experience in the planning and construction of overhead and underground lines for voltages up to and including 33 kV. Experience of the construction and equipment of transformer sub-stations and the planning of distribution network is also necessary. Corporate membership of the Institution of Electrical Engineers will be an advantage.

The salary for the post will be in accordance with the National Joint Board Revised Schedule, Class "J," Grade 7, i.e. £736/£753/£770 per annum.

SECOND ASSISTANT ENGINEER (OPERATION AND MAINTENANCE)

Applicants should have had a wide experience in the operation and maintenance of high voltage and low voltage networks, including both overhead lines and underground cables of voltages up to and including 33 kV, also high voltage testing and fault localisation. Corporate membership of the Institution of Electrical Engineers will be an advantage.

The salary for the post will be in accordance with the National Joint Board Revised Schedule, Class "J," Grade 7, i.e., £736/£753/£770 per annum.

Applications for the above appointments, stating age, education, qualifications and experience, present post and salary, should be received by R. H. Harral, M.I.E.E., M.Inst.F., Sub-Area Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee Street, Blackburn, not later than Saturday, June 16, 1951. (L 36)

MIDLANDS ELECTRICITY BOARD

Shropshire & Herefordshire Sub-Area

APPOINTMENT OF
SECOND ASSISTANT DISTRICT ENGINEER

APPLICATIONS are invited for the above position in the Shrewsbury District of the Shropshire and Herefordshire Sub-Area.

Applicants must have had experience in all branches of distribution work, including operation and maintenance of high and low voltage cables and overhead lines, substations, etc. Appropriate technical qualifications will be considered an advantage.

Conditions of service will be in accordance with the National Joint Board Agreement, and the salary will be in Class "D," Grade 7, £563 per annum.

Applications, stating age, present salary, full particulars of qualifications, experience and present position, should be forwarded within 14 days to Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.
May 25, 1951. (L 5)

MIDLANDS ELECTRICITY BOARD

Shropshire & Herefordshire Sub-Area

APPOINTMENT OF SECOND ASSISTANT
DISTRICT COMMERCIAL ENGINEER

APPLICATIONS are invited for the above position in the Shrewsbury District of the Shropshire and Herefordshire Sub-Area.

Applicants should have had a sound technical training with practical experience of industrial and domestic load development, and in particular contracting work, including maintenance and consumer service. Appropriate technical qualifications will be considered an advantage.

The appointment will be in accordance with National Joint Board conditions of service, and the salary will be Class "D," Grade 8, £524 per annum.

Applications, stating age, experience, and present salary, should be forwarded within 14 days to Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.
May 25, 1951. (L 8)

THE ABERDEEN HARBOUR COMMISSIONERS

INVITE applications for the post of OPERATIONAL AND ELECTRICAL SUPERINTENDENT for maintenance and operational duties in connection with docks equipment and electrical installations (including cargo cranes, pontoon docks, movable bridges, dock gates, electricity substations and transmission lines, etc.). Salary £550 rising by annual increments of £20 to £610 per annum.

The appointment is subject to the Commissioners' Superannuation Scheme and the candidate selected for appointment will be required to pass a medical examination before appointment.

Applications, stating age and qualifications, and furnishing full details as to experience, together with copies of recent testimonials, should be sent to the Harbour Engineer, 15 Regent Quay, Aberdeen, on or before June 14, 1951.

J. C. RENNIE,
Harbour Clerk.

Town House, Aberdeen.
May 31, 1951. (L 55)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

No. 3 (Sheffield) Sub-Area

GENERAL ASSISTANT ENGINEER (CONSTRUCTION AND MAINTENANCE)—ECCLESFIELD DEPOT.
(Vacancy No. 55/51)

Applicants should hold the Higher National Certificate in electrical engineering, and have had experience on electrical distribution, preferably e.h.t. overhead line systems. The successful applicant will be stationed at the Sub-Area Maintenance Depot at Ecclesfield, near Sheffield.

Salary—N.J.B. Agreement, Class "M," Grade 13, £590/£610 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, within fourteen days of the appearance of this advertisement.

No. 7 (Grimsby) Sub-Area

SENIOR ASSISTANT ENGINEER (METERS, TESTING AND PROTECTION).
(Vacancy No. 66/51)

Applicants should preferably be corporate members of the Institution of Electrical Engineers, hold an engineering degree or else possess equivalent qualifications, and must have had a wide experience in all classes of meter repairing and testing, protection equipment on systems up to 33 kV, and mains fault location, and be fitted to take charge of such work in the Sub-Area.

Salary—N.J.B. Agreement, Class "G," Grade 4, £821/£859 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, within fourteen days of the appearance of this advertisement. (L 38)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the following positions at Hams Hall "B" Generating Station, near Birmingham:

(*a*) ASSISTANT TO THE OPERATION AND EFFICIENCY ENGINEER. The grading for this appointment, which is subject to confirmation by the National Joint Board, will be provisionally Class "K," Grade 8, commencing salary £731 per annum.

(*b*) BOILER HOUSE SHIFT CHARGE ENGINEER. Salary in accordance with Class "K," Grade 9 of the N.J.B. Agreement, commencing at £687 per annum.

Candidates for (*a*) should possess the Higher National Certificate in electrical and mechanical engineering or an equivalent qualification, and should have had considerable experience in combustion and of the operation and maintenance of modern generating plant in a large power station.

Candidates for (*b*) should possess ordinary National Certificate in mechanical or electrical engineering, and should have had a sound technical training and considerable experience of combustion and the operation of h.p. boiler plant.

Conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Forms of application may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than June 23, 1951.

F. W. LAWTON,
Divisional Controller.
(L 53)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

STATION SHIFT CONTROL ENGINEER,
AVON GENERATING STATION

APPLICATIONS are invited from suitably qualified engineers for the position of Station Shift Control Engineer at Avon Generating Station, Warwick.

Candidates should have practical experience in the operation of generating station switchboards.

The salary will be in accordance with Class "E", Grade 10 of the National Joint Board Schedule at a commencing salary of £488 per annum, and the appointment will be superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham and be returned not later than June 22, 1951.

W. S. BURGE,
Divisional Controller.
(K 870)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of STATION SHIFT CONTROL ENGINEER at the Southport Power Station. Salary £465-£481 per annum, being Class "D," Grade 10, of the N.J.B. Agreement.

Applicants must have had experience of Shift Operation of power station plant, including the control of high and low tension switchgear. The possession of technical qualifications would be an advantage.

The appointment will be superannuable under the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary, Clarke Gardens, Woolton, Liverpool, and should be returned to him not later than Wednesday, June 20, 1951. (L 56)

LONDON ELECTRICITY BOARD

DRAUGHTSMAN

APPLICATIONS are invited for three positions as Draughtsman in the Design and Planning Branch at Falcon House, Aldersgate Street, E.C.1.

Applicants should be capable of making drawings of plant, cable layouts and line diagrams, also prepare details of steel or concrete structures from rough sketches supplied or from draughtsman's own measurements.

Pending grading of the posts under the national agreement of the appropriate negotiating body, the commencing salaries will be within the range of £300-£500 per annum inclusive, according to qualifications and experience.

Application forms, obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned, duly completed, within 10 days. Please enclose addressed foolscap envelope and quote ref. EST/V/1243/T on all correspondence. (L 54)

YORKSHIRE ELECTRICITY BOARD

AMENDED ADVERTISEMENT

No. 5 (Wakefield) Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER
(Castleford) (Vacancy No. 33/51)

APPLICANTS must have had a sound practical training and considerable experience in the construction, operation and maintenance of h.v. and L.V. overhead and underground distribution networks, substations, plant and ancillary equipment. Preference will be given to applicants who are Corporate Members of the Institution of Electrical Engineers or who hold equivalent qualifications.

Salary: N.J.B. Schedule Class "E", Grade 7 £579 to £609 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, within 14 days of the appearance of this advertisement. (L 67)

APPLICATIONS are invited for the post of OVERHEAD LINESMAN to be located in the Staythorpe area. Experience of 132 kV lines essential. Conditions and wages in accordance with N.J.I.C. Schedule.—Applications, stating age, experience, with copies of references, should be addressed to Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham. (L 19)

APPLICATIONS are invited from ENGINEERS for vacancies in a section responsible for scrutiny of new designs, modifications to cheapen manufacture, and the building of prototype heavy electrical switchgear. Fabrication or machining and assembly experience is necessary. Applicants should have appropriate production engineering experience, be familiar with cost analysis and preferably hold recognised technical qualifications.—Write, giving full details, quoting ref. 212A, to Central Personnel Services, 24-30 Gillingham Street, Victoria, London S.W.1. (K 812)

APPOINTMENT OF ASSISTANT DIRECTOR. A vacancy occurs for an Assistant Director. Applicants must be well educated, with some knowledge of the electrical industry and preferably of association work. Remuneration will be according to age and experience and applicants should name the salary required.—Write to A. B. Wildsmith, Electrical Wholesalers Federation, Kingsway House, Kingsway, London, W.C.2, marking your envelope "Personal." (L 14)

ASCO Ltd., are prepared to appoint SALES AGENTS for commercial refrigeration equipment in selected territories.—Asco Ltd., Refrigeration Division, Broadheath, nr. Manchester. (K 737)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

ASSISTANT ELECTRICAL ENGINEER, qualified, age 30 to 40, with good practical training, required for development and maintenance work by Harrods of Knightsbridge. Generation and distribution experience desirable. Permanent position—pension and sick pay scheme.—Apply in writing, or personally before noon any day except Saturday, to Staff Manager, 44 Hans Crescent, S.W.1. (L 63)

ASSISTANT ENGINEER required for British managed public electricity supply undertaking in India. Age 25-35 years. Should have experience of operation and or maintenance of large steam turbo-alternators and water tube boilers. Knowledge of distribution and administration would be deemed an advantage.

Gross salary Rs. 1,000/- per month, all in (equivalent to £900 per annum).

Free furnished quarters, electricity, fuel and medical attention and allowance towards servants wages. Liberal leave on full pay. Provident fund, deduction 5% with equal contribution by company. Passages out and home for single man and if married for wife and children under 12 years of age (maximum 3) provided.

Applications to give full details including candidate's age. Married or single and family, technical training, practical experience and to be accompanied by copies only of recent testimonials. The selected candidate will be required to undergo a medical examination.—Write Box "MA/194," c/o 95 Bishopsgate, London E.C.2. (L 40)

ASSISTANT ENGINEER for London office for design, detailing and estimating of overhead electric transmission lines.—Write Box 482, c/o Walter Judd Ltd., 47 Gresham Street, London E.C.2. (L 13)

ASSISTANT SUPERINTENDENT, under 40 years of age, required for works department manufacturing instruments relays, and instrument transformers. Minimum qualifications, Ordinary National Certificate, with recognised apprenticeship, followed by responsibility in practical planned production of similar apparatus.—Applications, giving full details, age, experience, technical qualifications, and salary required, to Box No. 7015, Electrical Times. (L 33)

BRITISH ELECTRICITY AUTHORITY, South Western Division. Skilled METER AND RELAY MECHANICS are required at Bristol. Candidates should have completed a works apprenticeship and be experienced in assembly and construction of electrical instruments of all types. Duties will include overhaul, adjustment, and re-winding of defective instruments. Knowledge of summation metering or protective relays would be an advantage. Conditions of employment in accordance with the N.J.I.C. Agreement.—Written applications should be sent to the Divisional Secretary, British Electricity Authority, South Western Division, 26 Oakfield Road, Bristol 8, to be received not later than June 23. R. C. Barrett, Divisional Secretary. (L 28)

CABLE ENGINEER required to design and supervise manufacture, processing, and testing of super-tension cable. This is a permanent, pensionable, senior appointment affording scope for development with established company. Applications should state fully previous experience, which is essential, and give details of training and qualifications.—Box No. 7011, Electrical Times. (L 26)

CIVIL Enginering Contractors in Liverpool (Kirkby) require DRAUGHTSMEN for arrangements of electrical equipment. Mechanical or electrical experience desirable, but not essential. Age 18-30. Salary according to age and ability.—Applications in writing, to The Staff Officer, B.I.C.C. Ltd., Prescot, Lancs. (L 31)

COMMERCIAL ASSISTANT required by large organization for their illuminating glassware department. Previous experience not essential but an advantage.—Box No. 7019, Electrical Times. (L 43)

FOR PAKISTAN

A well-known company in Pakistan, representing several reputable English manufacturers, requires an

ELECTRICAL SALES ENGINEER

normally for employment in Karachi. Age preferred: 22 to 28. Applicant must hold degree in electrical engineering or equivalent from a U.K. university, and have had two years' practical experience with an approved U.K. manufacturer. Preference given to man having training and experience with switchgear manufacture and estimating. Three years' agreement and six months' leave (with pay) from Pakistan if offered second agreement after termination. Initial kit allowance, £75. First-class passages. Monthly salary for single man, 1,100 rupees first year, 1,200 rupees second year, 1,300 rupees third year, plus local monthly allowance, 250 rupees. (Pakistan rupee at present worth approx. 2/2.) Additional allowance if married. Mutual contributory provident fund. Application must give full details of education, qualification, training and experience, and will be treated confidentially.

Apply Box No. 6091, Electrical Times.

(K 828p)

COMPETENT TRANSFORMER TEST ENGINEER required. Duties include the testing of all types of power transformers to 2,000 kVA, preparation of test certificates and general physical inspection of transformers.—Applicants should be to H.N.C. standard and have had previous transformer test experience. State experience and salary to Lindley Thompson Transformers, St. Mary's Road, Slough. (K 782)

COOKE AND FERGUSON, LTD., require SENIOR AND JUNIOR DRAUGHTSMEN for interesting high-voltage switchgear development projects.—Apply, stating age, experience, and salary required to the Personnel Manager, Messrs. Cooke and Ferguson, Ltd., South Street, Openshaw, Manchester 11. (L 35)

DESIGN ENGINEER required by successful old-established company in the North of England, engaged particularly in the manufacture of heavy duty d.c. switchgear. He should have scientific and commercial qualifications as well as practical experience, originality and initiative. He would have unlimited opportunity for developing his ability at a good salary, rising without limit according to his performance. To the right man the future prospects are bright.—Box No. 6079, Electrical Times. (K 805)

DRAUGHTSMAN required by consulting engineers in the London area, for general electrical layout work, including h.v. and l.v. indoor and outdoor substations. Applicants should possess H.N.C. or equivalent and should also be experienced in the preparation of system and cable diagrams.—Apply by letter only, marked: Ref. KJB/RFS to Messrs. Kennedy and Donkin, 12 Caxton Street, Westminster, S.W.1. (L 73)

DRAUGHTSMAN required with experience on design and development of metal-clad switchgear up to 250 MVA at 11 kV. Good salary offered for suitably qualified applicant. Pension scheme available.—Reply, stating age, salary and full details of technical qualifications and experience, to Erskine, Heap and Co. Ltd., Lancashire Switchgear Works, Salford, Manchester 7. (K 83))

DRAUGHTSMAN, with experience of transformer manufacture, required by electrical engineering company in north-east London. Permanent position with superannuation scheme for suitable applicant. Good salary and working conditions.—Write, stating age, experience and salary required, to Box No. 6065, Electrical Times. (K 772)

DRAUGHTSMEN.—Ewbank and Partners have vacancies for Mechanical Engineering Draughtsmen, preferably used to pipework arrangement and layout and power station design and layout. Positions are permanent with excellent prospects and are pensionable. Free lunches are provided and a five day week is in operation.—Applicants should write, stating age, experience and salary required, to The Secretary, Ewbank and Partners Ltd., Engineering Consultants, 15 Grosvenor Place, London S.W.1. (L 41)

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DRAUGHTSMEN experience shop layouts, air, water, gas services, etc. Buildings, heavy plant foundations, mechanical handling, etc., for expansion programme.—Apply, stating age, experience, etc., to Box No. 7025, Electrical Times. (L 66)

DRAUGHTSMEN, 20/30, with good basic training required for power-transformer work by established British company with expanding activity in Middlesex. Bonus and pension schemes.—Write, age, experience, qualifications and salary required, to Box No. 6059, Electrical Times. (K 759)

ELECTRICAL DRAUGHTSMAN required West Midlands, experienced low tension control gear layouts and diagrams. Must have good technical knowledge and preferably served apprenticeship in works. Good pension scheme, canteen facilities, five-day week with some overtime. State age, if married, present salary, and give references.—Box No. 6089, Electrical Times. (K 818)

ELECTRICAL DRAUGHTSMAN, familiar with light mechanisms or instruments and preferably with some circuit experience, required by Dowty Equipment, Ltd., Arle Court, Cheltenham, for their electrical development department. Age 21-25. Higher National Certificate preferred. The factory is ideally situated in the grounds of a country house and working conditions are excellent.—Write to Personnel Manager, stating age, experience and salary required. (K 872)

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ELECTRICAL ENGINEERING DRAUGHTSMAN required for large iron and steel works in North Lincolnshire. Experience required in layout of sub-stations and works electrical distribution systems.—Apply, stating age and record of experience to Box No. 7003, Electrical Times. (L 22)

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Applicants should preferably have experience of h.v. and l.v. switchgear, protective schemes, e.h.t. and l.t. cable layouts, lighting and power installations.

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ELECTRICAL FITTER wanted with experience of maintenance of 132 kV switchgear and transformers to be located at Nottingham Section Office, Newthorpe Street, Nottingham.—Applications, in writing, stating age, experience, with copies of references, should be addressed to Div. Establishments Officer, British Electricity Authority, Barker Gate, Nottingham. (L 18)

ELECTRICIANS required, experienced with a.c. and d.c. equipment and maintenance.—Apply Box No. 6099, Electrical Times. (L 3)

ELECTRICIANS' MATES required, conversant with usual duties.—Apply Box No. 7001, Electrical Times. (L 4)

ELECTRONIC ENGINEERS required by Airmec Laboratories, Ltd., Cressex, High Wycombe, Bucks, to be employed on interesting Government and commercial development work. Salary according to experience.—Write, giving full details, to Personnel Officer. (K 858)

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POWER STATION OR MARINE ENGINEERS. Applications are invited by The Calcutta Electric Supply Corporation, Ltd., for appointment to the posts of Shift Charge Engineers in Calcutta, where the company has three generating stations, each over 100-mW capacity. Candidates must either have had responsible operating experience in modern large high-pressure steam-generating stations or, alternatively, must have had marine experience with high-pressure water-tube boilers and turbines, and must hold a First Class Board of Trade Engineering Certificate; such candidates without previous power-station experience would be required, if selected, to undergo a course of training in the U.K. before proceeding to Calcutta. The appointments are permanent and selected candidates will be required to sign an agreement for three years. The monthly salary is in the grade Rs. 700-40-820 (E.B.), 900-45-1,035 (E.B.), 1,075-50-1,275, plus overseas pay minimum Rs. 200 monthly, plus overseas marriage allowance Rs. 250 monthly (the present rupee exchange is 1s. 6d.). The starting salary, in the above grade, of selected candidates will be fixed by reference to their training and operating experience There are, in addition, other generous allowances, including overseas child allowance and cost-of-living allowance In addition, free furnished quarters are provided, as is also free medical attention. Liberal leave and passage rules, contributory provident fund, etc.—Applications, giving age (about 35 to 40 preferred), details of training, experience, present position held, should be addressed to the Secretary, Calcutta Electric Supply Corporation, Ltd., Victoria House, Vernon Place, Bloomsbury Square, London W.C.1. (L 29)

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LIGHTING SALES ENGINEER for North London fittings manufacturers. Preparation lighting designs, general internal administrative duties as assistant to Senior Lighting Engineer. State salary required. I.E.S. member preferred.—Box No. 6077, Electrical Times. (K 804)

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SENIOR ASSISTANT (Male) required at the Hanley, Stoke-on-Trent Service Centre. Applicants must be experienced in the sale of domestic electrical apparatus. Salary N.J.C. Grade 2, £390/£450 per annum.—Applications, stating age, education and experience, within fourteen days to Sub-Area Manager, Midlands Electricity Board, Kingsway, Stoke-on-Trent. (L 12)

SENIOR ELECTRICAL DRAUGHTSMEN required by British firm with modern London office. Preferably with experience of power distribution and lighting installation as applied to oil refinery and chemical plants. Qualifications to H.N.C. standard. Good conditions of service, canteen facilities, pension scheme.—Write, stating age qualifications and experience, to Box 4964, c/o Charles Barker and Sons Ltd., 31 Budge Row, London E.C.4. (L 60)

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SENIOR MECHANICAL DESIGNER is required by the research laboratories of the General Electric Co. Ltd., East Lane, North Wembley, Middlesex, for work in the field of radio-communications, including airborne equipment. Good experience and academic qualifications are essential. Applications should be sent to the Personnel Officer (Ref. GBLC/205), giving details of age and record. (L 65)

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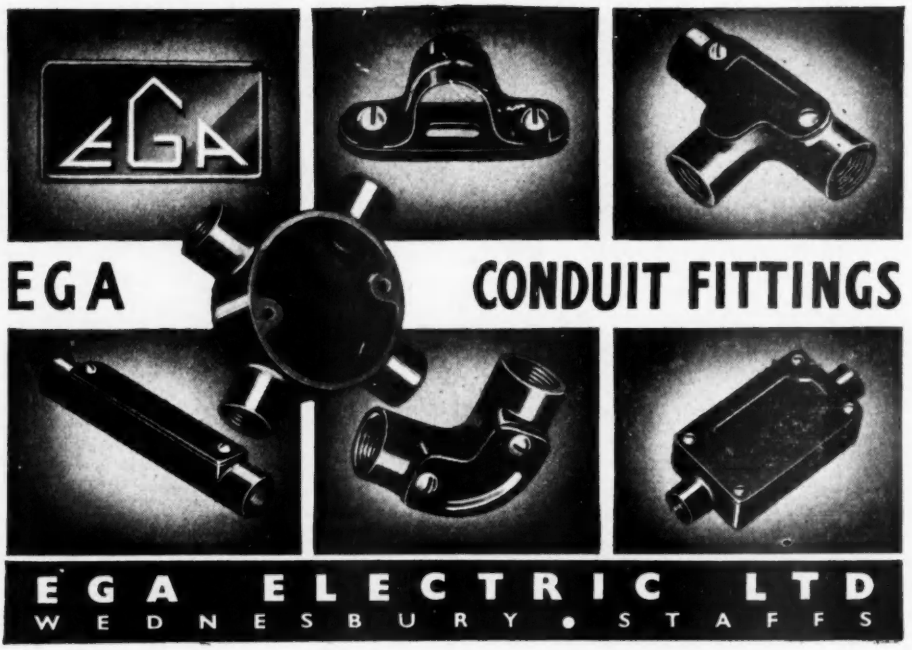

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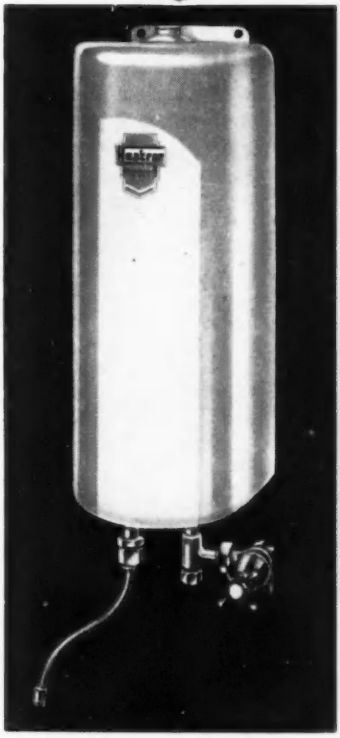

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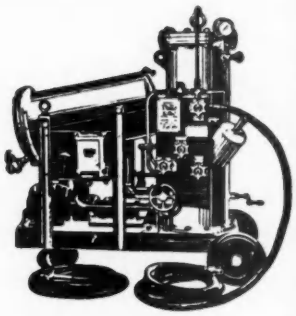

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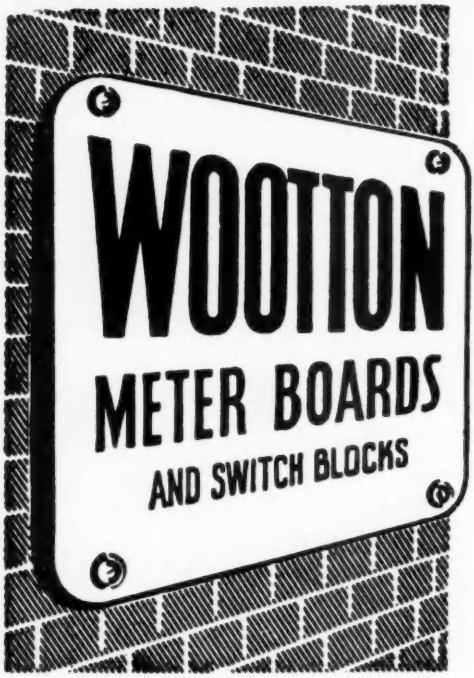

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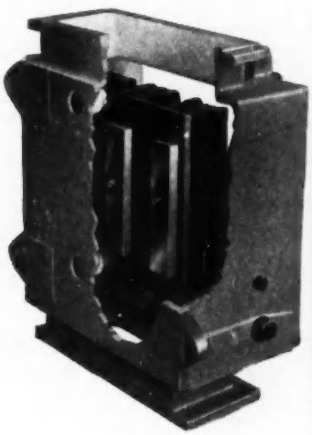

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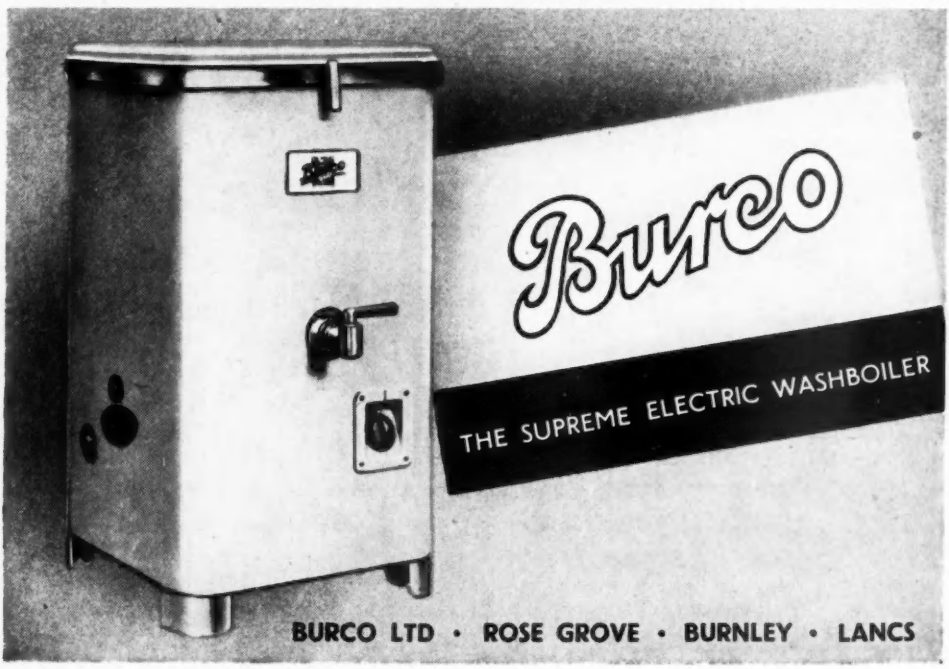

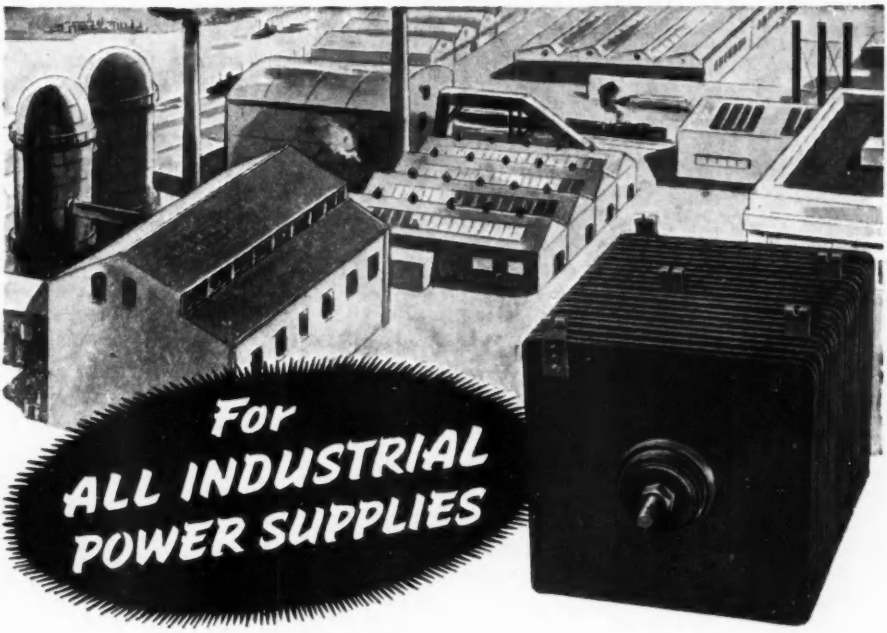

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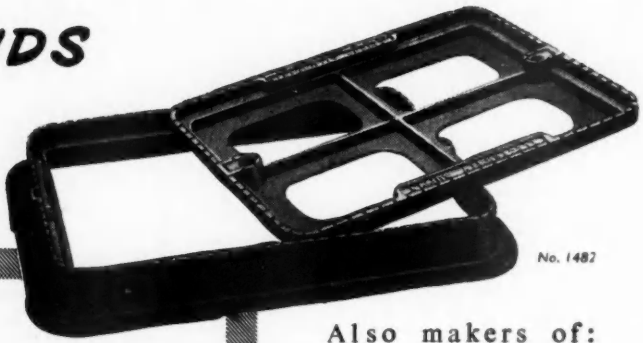

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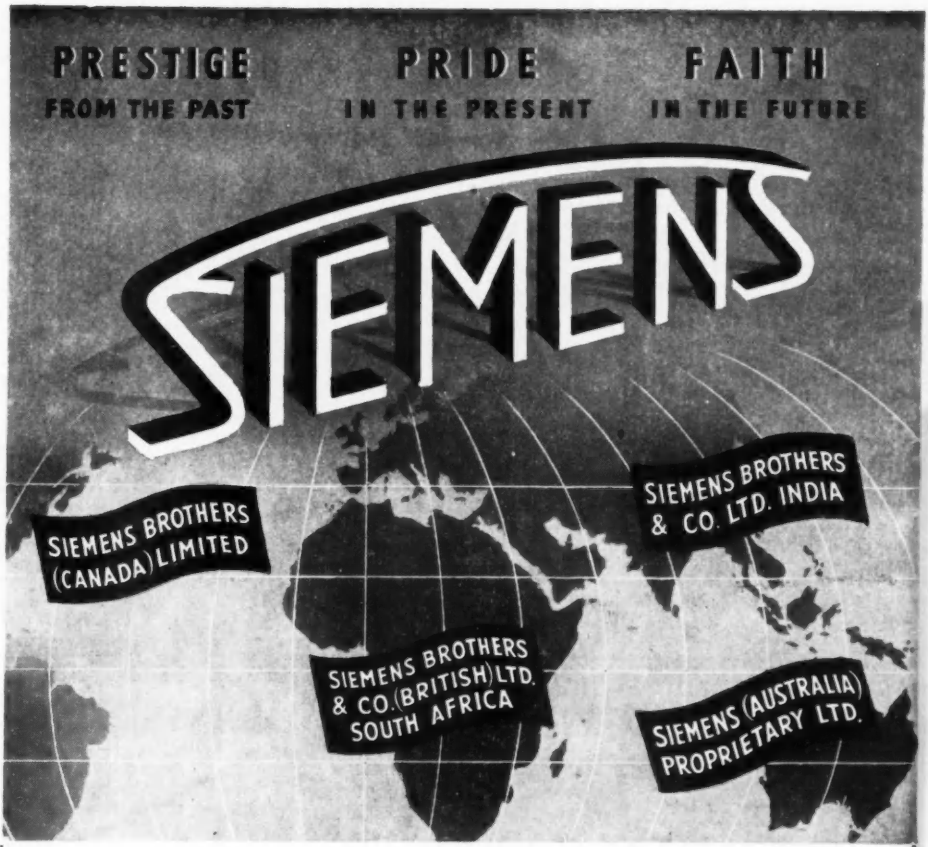

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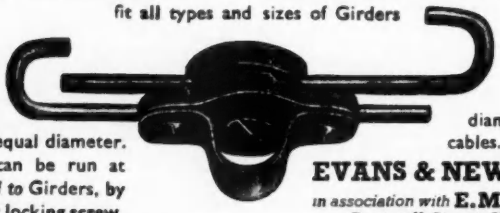

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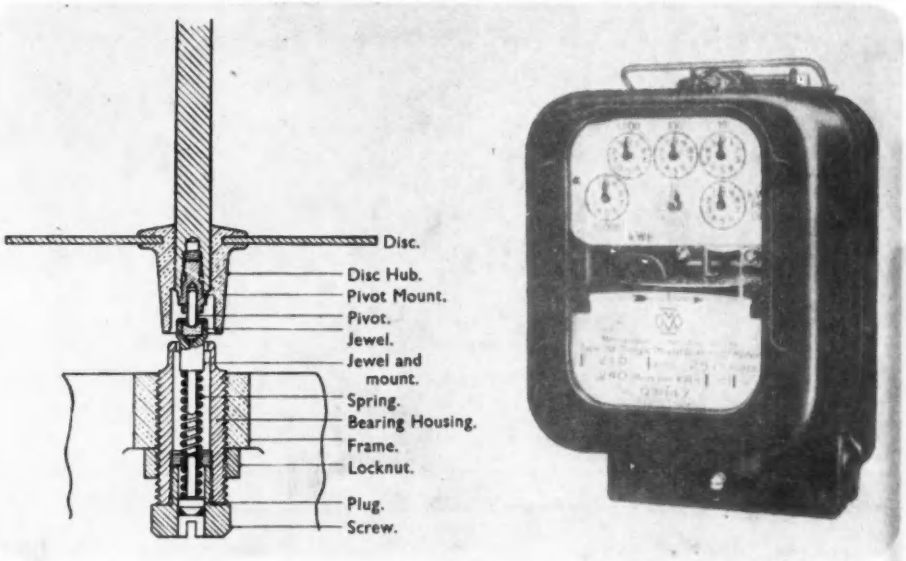

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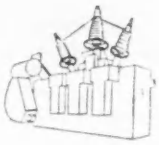

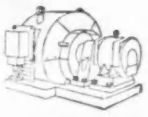

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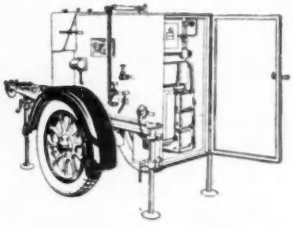

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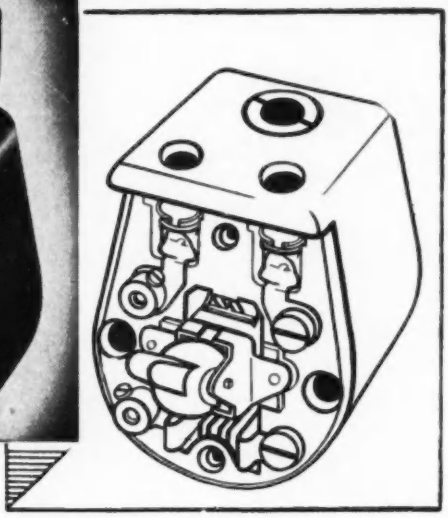

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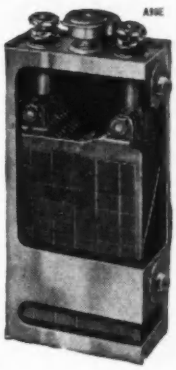

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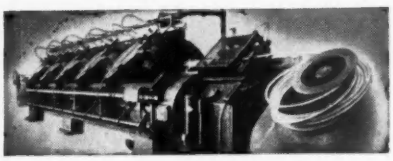

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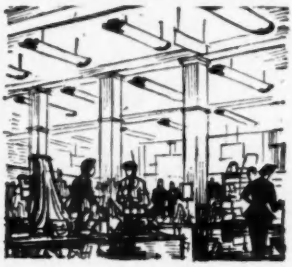

New shop and store lighting puts people in a buying mood and makes the most of the merchandise.

A well-lighted office encourages the staff and promotes greater accuracy.

Visitors carry away a good impression of hotels and restaurants that are bright and cheerful. M4331